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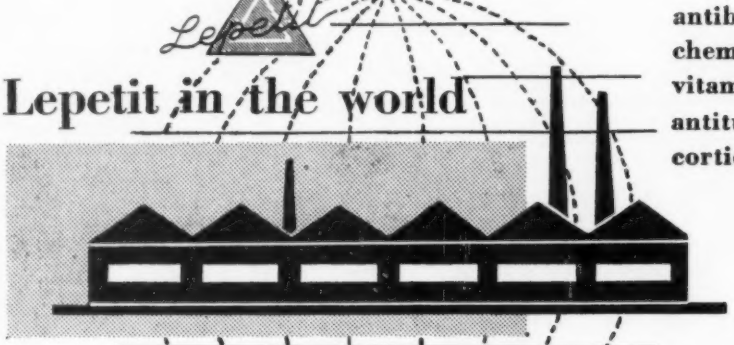

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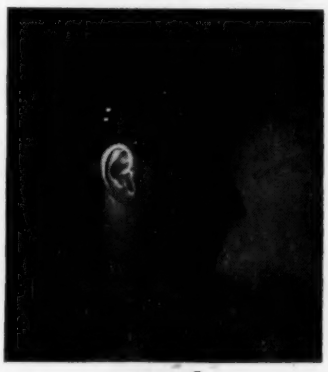

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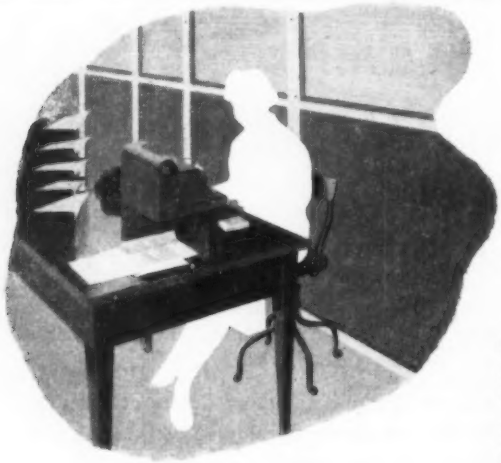

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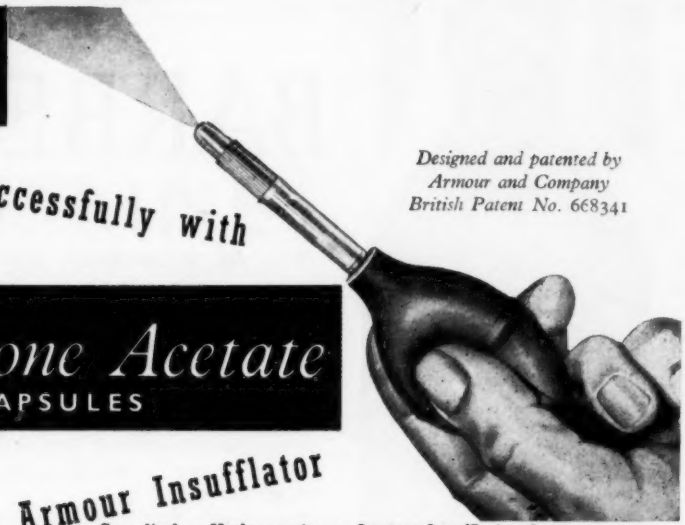

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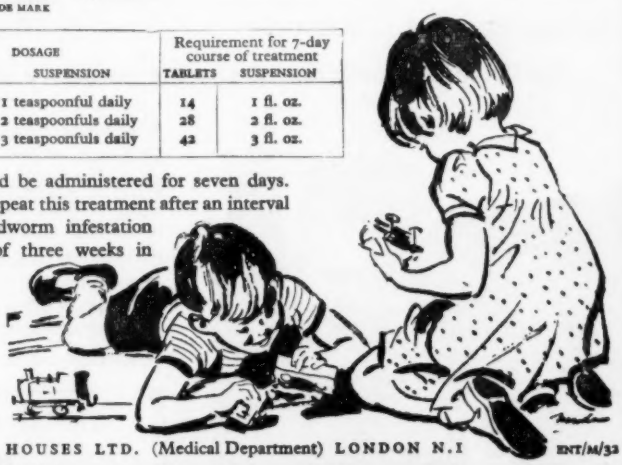


BASIC N.H.S. PRICES
TABLETS
Bottles of 25 at 3/- and 100 at 10/-
SUSPENSION
Bottle of 225 ml. (8 fl. oz.) approx. at 12/-

THE BRITISH DRUG HOUSES LTD. (Medical Department) LONDON N.1 ENT/M/32

FOR IMMEDIATE AND LONG-ACTING RELIEF OF ASTHMATIC ATTACK

RESPEDRINE
BRONCHO-SPASMOLYTIC TABLETS

Taken at the onset of asthmatic attack, Isoprenaline Sulphate in RESPEDRINE aborts the spasm and dilates the bronchioles, producing immediate relief.

To maintain this relief, RESPEDRINE contains two slower but longer-acting drugs—Ephedrine and Theophylline. A small amount of Phenobarbitone is included for sedation, and counteracts the stimulant action of Ephedrine.

- **Vital capacity of the lungs is increased.**
- **Two-in-one tablet giving immediate relief sustained for several hours.**
- **Does not have any stimulating effect.**
- **Packs 100's 12s., 500's 55s.**

FORMULA

Isoprenaline Sulphate	15 mg.
Ephedrine Hydrochloride	15 mg.
Theophylline	130 mg.
Phenobarbitone	8 mg.

Sample and literature free on request. May be freely prescribed on form E.C.10. "Respedrine" is a registered Trade Mark.

KUMAR (London) LTD. 91, Belmont Hill London, S.E.13. Tel.: LEE Green 5698

Save time on urine tests with . . .

CLINITEST and ACETEST

TRADE MARK TRADE MARK

Reagent Tablets
for the detection of Glycosuria

Reagent Tablets
for the detection of Ketonuria

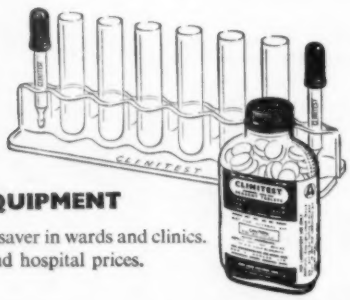
Both tests performed simultaneously in one minute!

Specialists, General Practitioners, Clinics and Hospitals in all parts of the country have used and prescribed 'Clinitest' Reagent Tablets since 1947. Many valuable hours have been saved. Now after intensive research work and clinical trials the makers of 'Clinitest' Reagent Tablets have produced 'Acetest' Reagent Tablets for the detection of Ketonuria. With 'Clinitest' and 'Acetest' Reagent Tablets, reliable routine sugar and acetone tests can be carried out *simultaneously* in one minute!

CLINITEST

No external heating · No measuring of reagents

Approved by the Medical Advisory Committee of the Diabetic Association. The 'Clinitest' set, refills and accessories are all available under the N.H.S. on Form E.C.10. (*Basic Drug Tariff Prices: Set 6/8 complete. Refill bottles of 36 tablets 2/4.*)



CLINITEST HOSPITAL EQUIPMENT

An invaluable time-saver in wards and clinics. Write for details and hospital prices.

The advantages of ACETEST Reagent Tablets

Quick and reliable, a single tablet provides all the reagents to perform a test. Low cost permits this tablet test to be used as a screening procedure or as a routine for diabetic patients. No danger of false positives with normal urine. No caustic reagents.

TO PERFORM A TEST:

1. **Put 1 drop of urine on tablet.**
2. **Take reading at 30 seconds. Compare tablet to colour chart provided.**
3. **Record results as negative, trace, moderate or strongly positive.**

Supplied in bottles of 100 tablets with colour scale.

'Acetest' Reagent Tablets (*diagnostic nitroprusside tabs.*) are also available under the N.H.S. on Form E.C.10. Basic Drug Tariff price 3/10 per bottle of 100 tablets (with colour scale).

REFERENCES

(1954) 'Clinical Tests for Ketonuria', *'Lancet', April 17th, pp. 801/804*
(1954) '*Medicine Illustrated*', *May, p. 289*
(1954) '*Practical Clinical Biochemistry*', *Heinemann, p. 74*
(1954) 'Clinical Tests for Ketonuria', *'Lancet', July 10th, p. 95*

AMES COMPANY (LONDON) LTD

Nuffield House, Piccadilly, London, W.1 · Telephone: REGent 5321

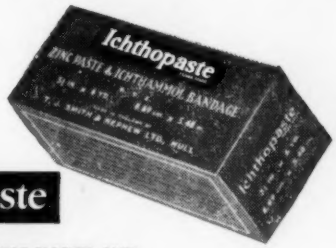
the Smith & Nephew range of paste bandages

All Smith & Nephew paste bandages are made from light cotton fabric, with non-fray edges, and they are thoroughly and evenly impregnated. Each bandage is supplied in an individual moisture-proof wrapper which minimises loss of moisture by evaporation.

Viscopaste

ZINC PASTE BANDAGES B.P.C.

Viscopaste zinc paste bandages are ready for immediate use on removal of the waterproof wrapping. They set quickly forming a thin shell. Viscopaste is indicated for eczematous conditions and also as a support for the leg following the removal of plaster of Paris casts. Viscopaste is obtainable in 6 yard lengths x 3½ ins. wide.



Ichthopaste

ZINC PASTE AND ICHTHAMMOL BANDAGES B.P.C.

These bandages contain 2 per cent ichthammol. They are indicated for eczematous conditions associated with leg ulceration, particularly when the eczema is of the weeping type. After application the paste never sets harder than its original spongy state, thus giving a resilient dressing over which an Elastocrepe or Elastoplast bandage may be applied to give firm elastic support. Ichthopaste is obtainable in 6 yard lengths x 3½ ins. wide. An improved, ready-for-use Ichthopaste bandage is available to hospitals, but it is not prescribable on Form E.C.10.

COLTAPASTE

ZINC PASTE AND COAL TAR BANDAGES B.P.C.

Coltapaste bandages are made from a light cotton fabric with non-fray edges and are thoroughly and evenly impregnated with a water miscible coal tar, zinc oxide, paste. Coltapaste is effective in the treatment of gravitational or varicose dermatitis and in the after-treatment of varicose ulceration in those cases where the skin has become dry and scaly. It is invaluable in the treatment of sub-acute dermatitis of the hands and in the treatment of occupational dermatitis. Coltapaste is obtainable in 6 yard lengths x 3½ ins. wide.

SMITH & NEPHEW PASTE BANDAGES ARE AVAILABLE ON E.C.10

an S&N product

SMITH & NEPHEW LTD · WELWYN GARDEN CITY · HERTS

Natural sleep – the best ally

REPARATIVE processes are most active during the hours of sleep. When patients need natural, recuperative sleep, and when narcotics are contra-indicated, 'Ovaltine' may be safely recommended for this reason: it provides palatable, concentrated nourishment in a form which is easily absorbed without disturbing the patient's tranquillity.

'OVALTINE' contains only the best of natural foods—malt, milk, cocoa, soya and eggs—plus added vitamins in standardized quantities. It is therefore useful in the dietary management of those diseases which are complicated by insomnia. It engenders a warm, soothing feeling which helps to create the conditions most favourable to the best kind of sleep. 'Ovaltine' can be recommended with confidence.

OVALTINE

Vitamin Standardization per oz.—Vitamin B_1, 0.3 mg.; Vitamin D, 350 i.u.; Niacin, 2 mg.

A. WANDER LIMITED, 42 Upper Grosvenor Street, London W.1

Manufactory, Farms and 'Ovaltine' Research Laboratories: King's Langley, Herts.

M.382

HOT
but not
bothered

CALADRYL* quickly and effectively relieves hot weather skin irritations, such as heat spots, sunburn, rashes, insect bites and nettle stings. It combines the soothing, mildly-astringent action of calamine with the anti-pruritic, anti-allergic effects of Benadryl. Supplied as a smooth, non-greasy lotion or as a water-miscible cream, Caladryl provides symptomatic treatment for irritative skin conditions, whether of allergic or non-allergic origin.

Trade Mark

CALADRYL

LOTION—*In bottles of 4 fluid ounces*
CREAM—*In tubes of approximately 1½ ozs.*
DISPENSING PACK—*Lotion: bottles of 80 fluid ounces. Cream: jars of one pound*

MEDICAMENTA VERA

PARKE, DAVIS & COMPANY, LTD. *(Inc. U.S.A.)* HOUNSLOW, MIDDLESEX. Tel: Hounslow 2361

347

13

"This extraordinary drug"

In Prolapsed Intervertebral Disc

Two recent reports praise the high value of BUTAZOLIDIN in the treatment of disc lesions.

One author, reporting a "90% success rate" in over 50 cases and "dramatic relief in the first 36 to 40 hours," expressed his belief that it performs a "medical manipulation." (1)

The second author stated that "in all the patients (25) the relief from pain was rapid and the condition was usually cured by the end of the 6-week period." (2)

1. *Lancet*, i (1956), 966 and 1069

2. *idem* 1069.

Detailed literature is available on request

GEIGY PHARMACEUTICAL COMPANY LTD., WYTHENSHAWE, MANCHESTER 23

PH.104

WHEN REPOSE IS A REQUISITE

Anxiety plays its part in every illness. It produces a tense, disturbed atmosphere for treatment. It often intensifies symptoms. Whenever or however it arises, anxiety cannot be ignored for its control is important to the patient's progress, even though specific treatment for the original illness may have been instituted.

Equanil cannot remove the cause of anxiety. What it does, however, is to restore the patient's shattered repose safely, effectively and reliably by relaxing mind and muscle, thus enabling him to view his behaviour in a clearer, dispassionate light.

EQUANIL (MEPROBAMATE)

Wyeth

PACKS: Bottles of 20 and 250 × 400 mg. tablets.

The word 'Equanil' is the registered trade mark of

JOHN WYETH AND BROTHER LIMITED, CLIFTON HOUSE, EUSTON ROAD, LONDON, N.W.1.

E.3.

Illustration :—A detail from An Old Woman Sewing XVIIth Century Dutch School. Reproduced by permission of the Trustees of the National Gallery.

cicatrin

to counter the changing pattern of bacterial resistance

All the available evidence of the development of bacterial resistance points to the need for a safe and effective means of securing control of local infections without the employment of those antibiotics which are of greatest value for systemic use.

a new advance in wound therapy:

CICATRIN has advantages over existing modes of wound therapy for the following reasons:—

- ★ is bactericidal and bacteriostatic.
- ★ minimizes the risk of the development of resistant strains.
- ★ is effective against most of the pathogens including those resistant to penicillin and streptomycin.
- ★ Healing is stimulated by selected amino acids.
- ★ is not cyto-toxic.
- ★ is active in the presence of blood and tissue exudates.
- ★ is non-allergenic.

FORMULA: Each gramme contains:
Neomycin Sulphate 5 mg.
Zinc Bacitracin 250 units.
l-Cystine 2 mg.
dl-Threonine 1 mg.
Glycine 10 mg.

PACKS: 15 gramme Sprinkler
15 gramme Collapsible Tube

cicatrin

cream and powder

amino acid and antibiotic

CREWE: *Telephone: Crewe 3251-5*

CALMIC LIMITED

LONDON: *2 Mansfield Street, W.1 Tel: LANgham 8038-9*

AUSTRALIA : 458-468 Wattle Street, Ultimo, Sydney, N.S.W.

CANADA Terminal Building, York St., Toronto

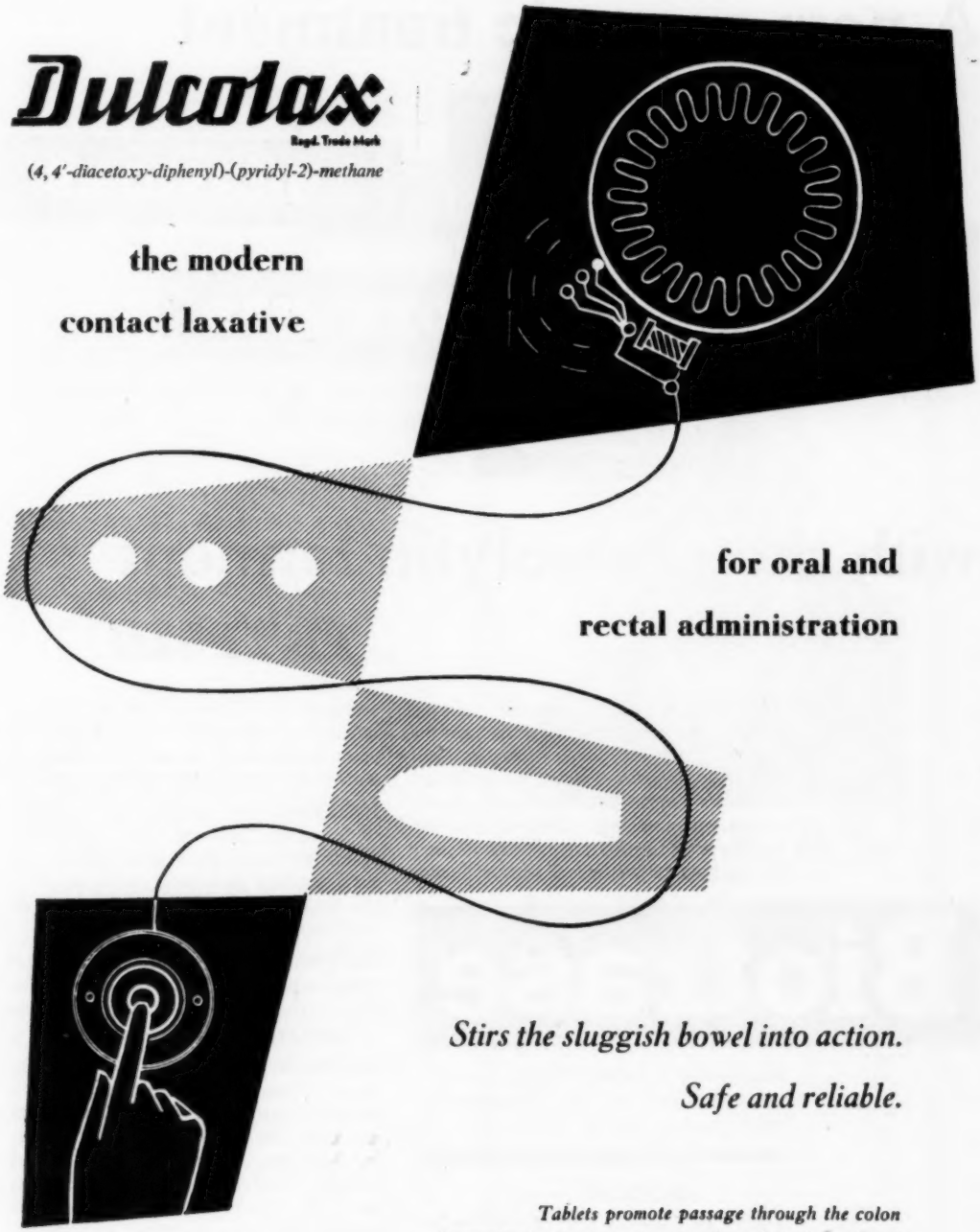
Dulcolax

Regd. Trade Mark

(4, 4'-diacetoxy-diphenyl)-(pyridyl-2)-methane

the modern

contact laxative



for oral and

rectal administration

Stirs the sluggish bowel into action.

Safe and reliable.

Tablets promote passage through the colon
Suppositories for prompt evacuation of the lower bowel

Dulcolax enteric coated tablets of 0.005 g. · Bottles of 30 and 200
Dulcolax suppositories of 0.01 g. · Boxes of 6 and 50

LEWIS LABORATORIES LTD., LEEDS 9

A new enzymic treatment

of **WOUNDS**

ABRASIONS

BURNS

PYODERMIAS

ULCERS

with the proteolytic ferment

TRYPSIN

IT HAS LONG been known that the proteolytic enzyme Trypsin could resolve necrotic tissue and was in theory an ideal physiological agent for the treatment of infected wounds. Its instability has, however, until recently precluded its use for this purpose. Lloyd-Hamol of London and Zurich have now succeeded in producing a cream, **BIOTRASE,** in which Trypsin remains physiologically active for over a year. A certificate of stability has been issued by a Department of Bio-chemistry.

BIOTRASE also contains two new antiseptic agents, both of which are active against a wide range of gram-positive and gram-negative pathogenic organisms. Unlike sulpha drugs and antibiotics they do not cause skin sensitivity.

BIOTRASE debrides necrotic tissue and purulent matter and leaves a clean granulating surface. It does not attack vital tissues.

Biotrase

BIOTRASE is available in 35 g. tubes at a basic N.H.S. price of 3/9d., and may be prescribed on Form E.C.10.

BIOTRASE *contains:*

Trypsin pur. 0.16%; *Ca-N-Hydroxymethyl-glutaminate* 5.00%; *2,2¹ thiobis-(4,6-di-chlorophenol)* 0.50%; *Carbamide B.P.* 5.0% *in polyethylene glycol.*

INDICATIONS FOR USE

BIOTRASE may be used wherever there is an infected—or potentially infected—breach of surface of the skin. Common conditions for its use include the following: wounds; second and third degree burns; infected and necrotic skin conditions, including pyodermias; boils and carbuncles (following incision); all types of skin ulcers. **BIOTRASE** has been found most useful in the treatment of varicose ulcers, providing these are not surrounded with avascular tissue and of long duration.

SAMPLES AND LITERATURE GLADLY SENT ON REQUEST

LLOYD-HAMOL LTD.

11 WATERLOO PLACE, S.W.1

Biotrase *is a registered trade mark of Lloyd-Hamol Ltd.*

Facts his doctor wasn't told...

Retired for the last three years, the patient complains that he's unable to keep pace with his gentle present-day routine. 'Says he's always tired . . . can't understand it as he's always been so active for his age. He doesn't say however that since his wife died, he's lost interest in his food . . . his attention to diet has been lacking and regular meals have been replaced by casual snacks.

GEVRAL Geriatric Vitamin—Mineral Supplement was evolved to enable doctors to treat just such patients—to provide a balanced ration of essential nutrients in the simplest form. The usual dosage is one capsule daily—and the GEVRAL formula is so comprehensive that this routine provides effective all-round supplementation. Indeed, for many elderly patients the result is a gratifying return of general well-being —and the rediscovery that life *is* worth living!

GEVRAL*

Capsules

Geriatric Vitamin—Mineral Supplement

Each capsule contains:

Vitamin A	5,000 I.U.	Ascorbic Acid (C)	50 mg.
Vitamin D (viosterol)	500 I.U.	(Purified intrinsic factor concentrate 0.5 mg.)	
Vitamin B_{12} as present in concentrated extractives from streptomyces fermentation	1 microgram.	Rutin	25 mg.
		Iron (as $FeSO_4$)	10 mg.
Thiamine mononitrate (B_1)	5 mg.	Iodine (as KI)	0.5 mg.
Riboflavine (B_2)	5 mg.	Calcium (as $CaHPO_4$)	145mg.
Niacinamide	15 mg.	Phosphorus (as $CaHPO_4$)	110 mg.
Folic Acid	1 mg.	Boron (as $Na_2B_4O_7.10H_2O$)	0.1 mg.
Pyridoxine HCl (B_6)	0.5 mg.	Copper (as CuO)	1 mg.
Calcium pantothenate	5 mg.	Fluorine (as CaF_2)	0.1mg.
Choline dihydrogen citrate	100 mg.	Manganese (as MnO_2)	1 mg.
Inositol	50 mg.	Magnesium (as MgO)	1 mg.
Vitamin E	10 Units	Potassium (as K_2SO_4)	5 mg.
		Zinc (as ZnO)	0.5 mg.

another member of the

LEDERLE VITAMIN RANGE

*REGD. TRADEMARK

LEDERLE LABORATORIES DIVISION *Cyanamid* OF GREAT BRITAIN LTD., London, W.C.2 Lederle

THE PROBLEM OF FUNCTIONAL DISEASE

? CARDIAC

characters

W. Bonnington-Smith M.D., M.R.C.P.	-	Consultant Cardiologist
Alexander Paine M.R.C.S., L.R.C.P.	-	General Practitioner
Miss Elfreda Molesworth	-	A spinster aged 62

The scene is set in the sitting room of the patient's house during a domiciliary visit.

(Although this conversation is based on a real case, the characters portrayed are fictitious. Any resemblance to persons whether living or dead is purely coincidental).

MISS MOLESWORTH'S SITTING ROOM. THE BEDROOM DOOR IS OPEN.

Dr. B-S: "Well, Alex, let's go and look at the tracing in the other room. . . . You keep warm, Miss Molesworth and we'll come back and tell you the verdict."

DR. BONNINGTON-SMITH ENTERS THE SITTING ROOM AND GOES OVER TO THE WINDOW FOLLOWED BY DR. PAINE. THEY SPREAD THE PAPER ALONG THE SILL AND BEND OVER IT.

Dr. P: "You'll have to interpret, Willie, I can never recognise anything more subtle than an inverted T. wave."

Dr. B-S: "O.K. You hold the other end while I mark it." HE MOVES ALONG THE STRIP, WRITING WITH HIS BALL-POINT PEN. THERE IS A SOUND OF MUTTERING AS HE DOES IT. WORDS LIKE "Diphasic Q.R.S." ARE HEARD.

FINALLY HE STRAIGHTENS UP. "There's nothing here apart from the extra systoles. The old girl may be getting cardiac pain but I doubt it. She's not hypertensive. No, she certainly hasn't had a coronary."

Dr. P: "She looked pretty awful when she called me out last night. What the devil can it be?"

Dr. B-S: "Anxiety, I think. Cardiac neurosis some people call it, or pseudo-angina - bad name. You really made the diagnosis when you told me she had nursed her mother who died of a coronary. The E.C.G. only confirms it."

Dr. P: "Well, that's a relief. I like old Freda. She teaches me how to grow chrysanthemums. What shall I give her?"

Dr. B-S: "Oblivon-C. The new long-acting derivative of Oblivon. It'll control her panic and it's safe . . . plus bags of reassurance. Come on, I'll start the good work . . . "

OBLIVON – C (Methylpentynol Carbamate)
is a product of British Schering Limited, Kensington High Street, London, W.8.

" . . . or great ugly things,
all legs and wings,
with nasty long tails
arm'd with nasty long stings . . . "

SANDOSTEN+CALCIUM–SANDOZ OINTMENT

—ensures prompt relief from pain and irritation in the treatment of insect bites and stings—and nasty sunburn, too.

SANDOZ

SANDOZ PRODUCTS LIMITED

134, *Wigmore Street, W.*1.

3 essentials to sound clinical IRON replacement

In post-haemorrhagic states; as a therapeutic or precautionary measure during and after pregnancy; in adolescents, old people and those of unsound dietary habits, Ferraplex B is ideal for iron-deficiency anaemias of all kinds.

1 It contains adequate FERROUS iron in a form yielding rapidly increased and sustained haemoglobin levels.

2 The supplements it contains—copper, complete vitamin B complex, ascorbic acid—ensure that not only the additional iron but that present in the diet is fully utilised for haemopoiesis.

3 It is extremely well tolerated by patients of all ages, even those who usually react unfavourably to unmodified doses of iron salts.

COMPOSITION

The average daily dose of six FERRAPLEX B tablets contains:

FERRI SULPH. EXSICC., B.P. . . . . 1 gramme
COPPER CARBONATE . . . . . 2 mg.
ASCORBIC ACID (Vitamin C) . . . . . 50 mg.

NATURAL VITAMIN B COMPLEX EXTRACT: 2 grammes *prepared from brewers' yeast and including*
Aneurine hydrochloride (Vitamin B_1) . . . 3 mg.
Riboflavine (Vitamin B_2) . . . . . 6 mg.
Nicotinamide . . . . . 30 mg.
and all the other naturally occurring factors of the vitamin B complex.

Bottles of 50 *tablets :* 5/3*d* (*Retail*) *;* 250 *tablets* 15/6*d* (*Basic N.H.S. price*).

FERRAPLEX B

C. L. BENCARD LTD · PARK ROYAL · LONDON · N.W.10.

"Summer is ycumen in
Loude sing Cuckoo!" *(13th cent. song)*

Like the medieval poet most of us welcome the approach of summer, but for many, the Cuckoo heralds a Hay Fever season and acute distress. Pabracort insufflations have proved their value in the control of Hay Fever both by clinical trial and in general practice. Dramatic relief is usually obtained within two or three days and complete alleviation after two weeks treatment.
Each insufflation capsule contains 15 mg. hydrocortisone acetate in a specially prepared snuff base (micronized).

Reference: Lancet (1956) i., 537.

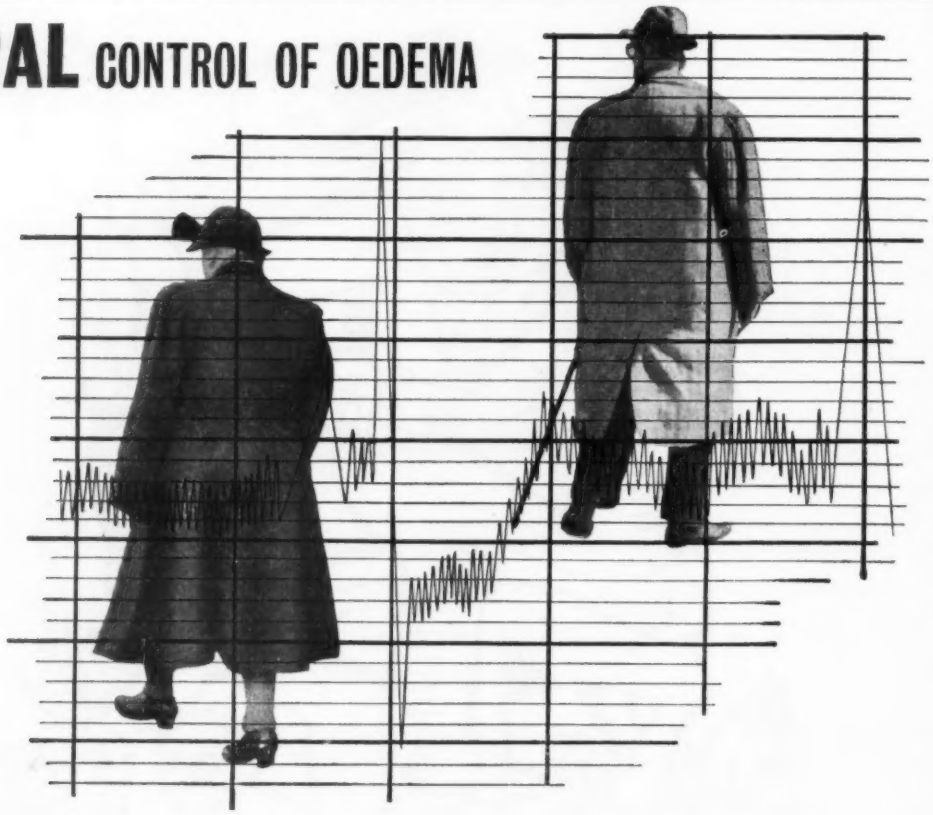
PABRACORT

INSUFFLATIONS

Packings: Pabracort outfit (10 capsules and insufflator)
Capsules 10, 25, 100.

PAINES AND BYRNE LTD., PABYRN LABORATORIES, GREENFORD, MIDDX

ORAL CONTROL OF OEDEMA



Oedema in cardiac patients can now be successfully controlled by Mercloran, a mercurial diuretic which is effective when given orally. Two to three Mercloran Emplets daily maintain a smooth oedema-free state and eliminate the see-saw effect of preparations given intermittently. Mercloran in most cases completely eliminates the need for injection. However, in the acute case where it is deemed necessary to initiate treatment parenterally, the chemically related compound, Mercardan, is available.

MERCLORAN

(CHLORMERODRIN N.N.R.)

EMPLETS: (enteric coated tablets)
In bottles of 25 and 250

AND MERCARDAN FOR PARENTERAL USE

PARKE, DAVIS & Company, Limited *(Inc. U.S.A.)* **Hounslow, Middlesex · Tel. Hounslow 2361**

571

DRAMAMINE* IN VERTIGO

Labyrinthine Disturbance

Long recognised as a standard for the management of motion sickness, Dramamine has become accepted in the control of a variety of other clinical conditions characterised by vertigo.

Vertigo, it has been claimed†, is primarily due to a disturbance of those organs of the body that are responsible for body balance. When the posture of the head is changed, the gelatinous substance in the semi-circular canals begins to flow. This flow initiates neural impulses which are transmitted to the vestibular nuclei. From this point impulses are sent to different parts of the body to cause the symptom complex of vertigo.

Some impulses reach the eye muscles and cause nystagmus ; some reach the cerebellum and skeletal muscles and righting of the head results ; others activate the emetic centre to result in nausea, while still others reach the cerebrum making the person aware of his disturbed equilibrium. *Vertigo may be caused by a disease or abnormal stimuli of any of these tissues involved in the transmission of the vertigo impulse, including the cerebellum and the end organs.*

A possible explanation of Dramamine's action is that it depresses the overstimulated labyrinthine structure of the inner ear. Depression, therefore, takes place at the point at which these impulses, causing vertigo, nausea and similar disturbances, originate. Some investigators have suggested that Dramamine may have an additional sedative effect on the central nervous system.

Repeated clinical studies have established Dramamine as valuable in the control of the symptoms of Ménière's syndrome, radiation sickness, hypertension vertigo, the vertigo of fenestration procedures, labyrinthitis and vestibular dysfunction associated with antibiotic therapy, as well as in motion sickness.

Any of these conditions in which Dramamine is effective may be classed as " disease or abnormal stimuli "† of the tissues including the end organs (gastro-intestinal tract, eyes) and their nerve pathways to the labyrinth.

Dramamine (brand of dimenhydrinate) is supplied in tablets of 50 mg. in bottles of 12, 36, 100 and 1000 tablets and in cartons (10 strips of 10 tablets). G. D. Searle & Co., Ltd., High Wycombe, Bucks. Tel. High Wycombe 1770.

*Regd. Trade Mark

†" Dizziness " : Vertigo and Syncope, G.P. *8*:35 (Nov.) 1953.

The site of Dramamine's action is probably in the labyrinthine structure.

SEARLE

DR:P116

ADRENOXYL

Reduces the mean bleeding-time

Adrenoxyl reduces the mean bleeding-time by decreasing the permeability and increasing the contractility and resistance of the capillary wall.

A dry field at operation

Adrenoxyl has been successful in diminishing capillary bleeding in a wide range of surgical operations. It has proved particularly useful in ear, nose and throat, ophthalmic and plastic surgery. In plastic surgery of the face it has been reported that, post-operatively, there is less swelling and bruising when Adrenoxyl has been used.

No side effects

Adrenoxyl does not have any side effects or contraindications. It does not affect blood coagulation, blood pressure or pulse rate and does not possess any sympathomimetic properties.

In medical conditions

Adrenoxyl has been used with success in those medical conditions associated with capillary fragility.

In the British Medical Journal (April 21st, 1956) a correspondent confirmed the value of Adrenoxyl in providing a dry field for the surgeon and in shortening the duration of the operation.

Packs

Ampoules: Boxes of 6 and boxes of 50.
Each ampoule contains 0.75 mg. of adrenochrome monosemicarbazone dihydrate.

Tablets: Tubes of 25 and bottles of 500.
Each tablet contains 2.5 mg. of adrenochrome monosemicarbazone dihydrate.

The best results are obtained when both tablets and ampoules are used.

HORLICKS LIMITED

Pharmaceutical Division Slough Bucks

Literature and samples are available on request to the Medical Information Dept.

Hay Fever

The use of a nasal decongestant for symptomatic relief in hay-fever is well established in clinical practice. For this purpose the preparation which meets all the basic requirements of the ideal nasal decongestant is . . .

Fenox nasal drops

Isotonic Nasal Drops of Phenylephrine and Naphazoline.
Basic N.H.S. price 1/8 per ½ fl. oz. dropper bottle.

Detailed literature gladly sent on request

BOOTS PURE DRUG COMPANY LIMITED, NOTTINGHAM, ENGLAND

Boots

27

PENTOXYLON

COMPREHENSIVE THERAPY FOR ANGINA PECTORIS

- **Prevents coronary spasm**
- **Averts attacks**
- **Dispels fear**

PENTOXYLON

- * *reduces nitro-glycerin requirements.*
- * *reduces severity of attacks.*
- * *reduces incidence of attacks.*
- * *reduces tachycardia.*
- * *reduces anxiety, allays apprehension.*
- * *reduces blood-pressure in hypertension.*
- * *increases exercise tolerance.*
- * *produces objective improvement demonstrable by electro-cardiograph.*

It is recognised that complete angina therapy should not only relieve the coronary spasm, but should help to prevent attacks. This has been accomplished by 'Pentoxylon' to a considerable degree. 'Pentoxylon' combines the benefits of two powerful and reliable agents — 'Rauwiloid' and P.E.T.N. 'Rauwiloid', an alkaloidal extract of *Rauwolfia serpentina*, has bradycardic, tranquillising and stress-relieving properties, and stabilises the patient emotionally. P.E.T.N. produces a long-sustained dilatation of the coronary blood vessels, so improving the circulation to the myocardium, reducing the severity of attacks when they occur. The dual action of 'Pentoxylon' provides a more comprehensive . . . more effective . . . therapy than has hitherto been possible using a single medicament, and it infuses the anginal patient with a feeling of well-being and hope.

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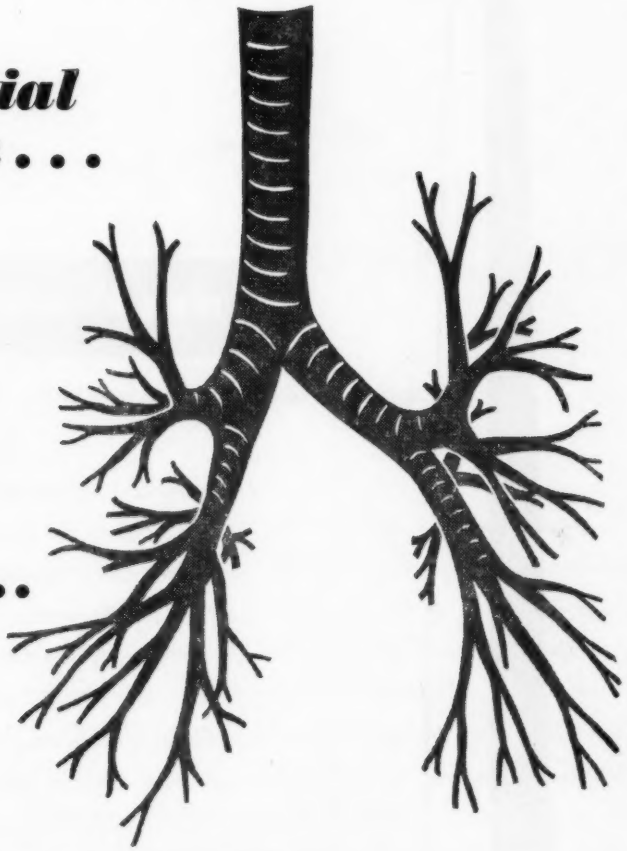

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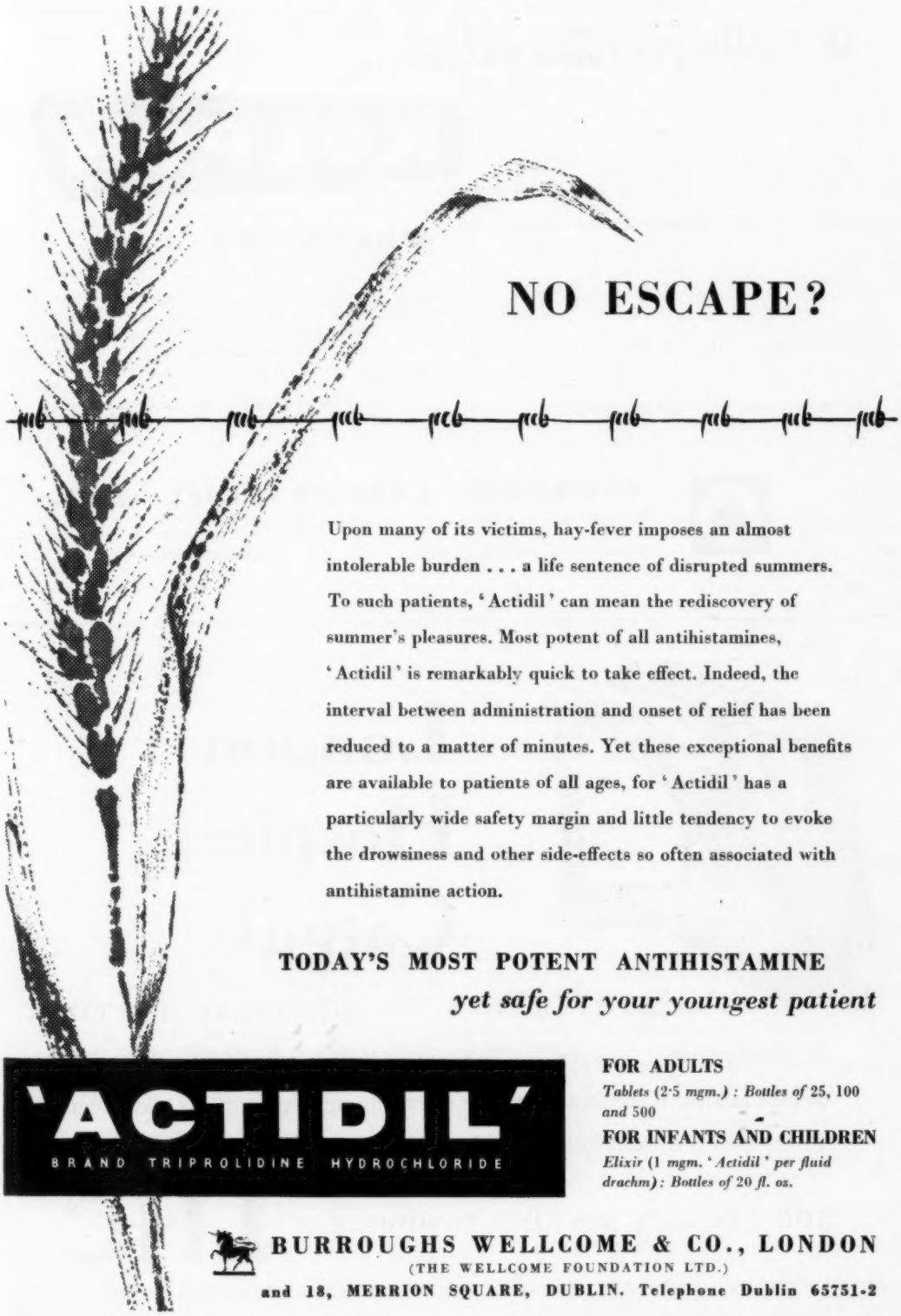

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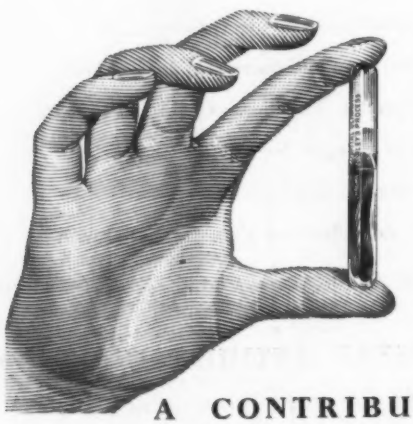

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HE INFLUENCE OF DIETARY FATS ON SERUM-LIPID LEVELS IN MAN

EDWARD H. AHRENS, JUN. M.D.
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From the Rockefeller Institute, New York, N.Y.

THE rôle of unsaturated fatty acids in human nutrition is a topic of rapidly increasing popularity in both scientific and lay publications. It has been claimed that ingestion of this group of fatty acids decreases the concentration of lipids in the serum and that an inadequate intake of these acids may be the cause of the high serum-lipid levels so prevalent in Western civilisation. Since these high levels are allegedly involved in the pathogenesis of arteriosclerosis and coronary disease, it has been tempting to implicate lowered intakes of unsaturated fatty acids in the rising incidence of these diseases. Although existing experimental data do not as yet warrant such conclusions, there is mounting evidence that the precise chemical composition of ingested fatty acids, in particular the degree of saturation, may have considerable significance in both health and disease (Sinclair 1956).

A number of experimental observations indicate that saturated and unsaturated acids are not metabolically equivalent, as previously assumed.

1. Burr and Burr (1929) demonstrated that certain polyunsaturated acids cannot be synthesised by rats, and that diets devoid of these acids produce a distinctive deficiency syndrome. Since then it has been shown that linoleic, arachidonic, and other acids are essential for many species (Holman 1956). The complete deficiency syndrome is produced only by exclusion of these acids from the diet of growing animals; thus, it is hardly surprising that this deficiency state has never been clearly demonstrated in man.

2. The turnover-rate of unsaturated acids is slower than that of saturated acids in rat liver and rat carcass (Pihl et al. 1950), suggesting differences in the metabolic pathways of these two groups of acids.

3. Studies of the structure of natural lecithins show unsaturated acids to be preferentially esterified at the alpha carbon of glycerol (Hanahan 1954), whereas most triglycerides are built with these acids esterified in the beta position (Mattson, personal communication). Such structural differences indicate different metabolic pathways.

4. Enzymatic esterification of cholesterol in the intestinal lumen is more rapid with unsaturated fatty acids than with saturated acids (Swell and Treadwell 1955). Another relationship of essential fatty acids to cholesterol metabolism has recently been pointed out (Alfin-Slater et al. 1954)—i.e., that in the rat deficient in essential fatty acids the content of cholesterol esters in the liver is greatly elevated but serum-levels are decreased. Peifer and Holman (1955) have shown that this deficiency state in rats can be accelerated by feeding cholesterol in the fat-free diet. Since the cholesterol of serum is preferentially esterified with highly unsaturated acids (Clément et al. 1955), this mechanism may remove these acids from sites where they exert their essential quality (Klein and Johnson 1954).

The most recent stimulus to study in this field comes from clinical investigations which suggest that levels of serum-lipids may be related to the dietary intake of unsaturated fatty acids. Kinsell and Michaels (1955) found that the feeding of coconut oil (a highly saturated fat) produced higher levels than the feeding of a highly unsaturated oil, soybean oil. Long-term feeding tests in this laboratory (Ahrens et al. 1955) indicated that serum levels of cholesterol and phospholipids varied inversely with the iodine number of six different dietary fats. The findings of these two laboratories were greatly extended in the detailed report by Bronte-Stewart et al. (1956) and also were confirmed by the experiments of Beveridge et al. (1956).

None of the experiments known to us has proven conclusively that the effect on serum-lipids of these dietary fats is due to the double-bond structure of their fatty acids. Nevertheless, there has been widespread acceptance of this hypothesis by workers in human nutrition, and broad applications of the hypothesis have already been made. Since we think these extensions premature, it seems appropriate for us to set forth in some detail the studies carried out by us over the past 3 years which bear upon the important questions at issue. The unique design of these studies was based on the belief that nutritional experiments can be carried out as precisely in man as in animals. In view of numerous well-known differences in species response to nutritional variation, such an approach seemed essential. All recognised extra-dietary factors influencing serum-lipid levels were kept to a minimum. Patients were carefully selected and then observed within the closely supervised environment of the metabolic ward for periods long enough to assure establishment of equilibrium states. Dietary intakes were simplified and rigidly standardised; even the variable of cooking was eliminated. Yet all known requirements for essential foodstuffs, minerals, and vitamins were generously supplied. Medical and hospital care were provided to the patients without charge, and constant attention was paid to socio-economic factors which might disrupt their adjustment to the study situation. Under these circumstances the data obtained have quantitative as well as qualitative usefulness.

Methods of Present Studies

In our previous studies (Ahrens et al. 1954a) six obese but otherwise normal subjects were fed diets containing 12% of calories as protein and 50% as fat. Solid foods made up a large part of the dietary intake. At intervals of 6 to 8 weeks, vegetable and dairy fats were exchanged isocalorically without altering other variables. Clear-cut decreases in serum-lipid levels were produced when the vegetable fats were fed. These findings confirmed and extended the original report of Kinsell et al. (1952).

To investigate this effect it was evident that more precise control of the diet was required. Accordingly, a technique of oral feeding of liquid formulas was developed (Ahrens et al. 1954b) and has been used almost exclusively in all feeding experiments since 1953. With this method patients were maintained at constant body-weight by suitable adjustment of caloric intake, the proportions of foodstuffs remaining unchanged. Changes in body-weight rarely exceeded 1 kg. The basic formula consisted of protein 15%, fat 40%, and carbohydrate 45% of total calories. There was no source of calories other than the formula. Formula feeding has been used uninterruptedly for 36 months in one patient without recognised ill effect; however, in most of the experiments discussed below the feeding tests lasted 4 to 6 months. Thirty-eight of forty patients were observed continuously under strict metabolic-ward conditions; four of the forty were sufficiently motivated and intelligent to follow the regimen at home. Iodised salt (2 g. sodium chloride with 200 μg. potassium iodide),‡ 2 multi-

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‡ We are indebted to Dr. Clayton Rich, Rockefeller Institute Hospital, for demonstrating a requirement for supplemental iodine in our patients maintained solely by oral formula feeding. Unpublished serial radioactive iodine studies showed significant increases in uptake in some patients in less than one month.

vitamin capsules, and ferrous gluconate (0·3 g.) were given daily as supplements. The entire protein intake was derived from milk proteins; the intake of nitrogen and pattern of amino-acid intake were considered completely adequate for adult men and women (Rose et al. 1955).

The subjects of these studies were hypercholesteræmic or hyperlipæmic patients (some with clinical evidence of arteriosclerosis and xanthomatosis) and normocholesteræmic patients with arteriosclerotic heart-disease. Table I lists the pertinent clinical data. All patients were free from conditions which might complicate the interpretation of long-term metabolic studies, such as renal, hepatic, endocrine, or infectious disease, or nutritional deficiencies. All were ambulatory. Patients with cardiac decompensation were considered ineligible for these studies because of our dependence on daily measurements of body-weight as an index of energy balance.

In addition to routine clinical tests, weekly measurements were made of total and free serum-cholesterol (Sperry and Webb 1950), total serum-lipid phosphorus (Stewart and Hendry 1935), and total serum-lipids (Ahrens et al. 1954a). Cholesterol esters and serum triglycerides were calculated from these basic data; generally accepted mean molecular weights for the cholesterol esters (645) and phospholipids (775) were used in these calculations. Rapid determinations of total cholesterol (Abell et al. 1952) made each week checked (within 5%) with the Sperry-Webb values. Studies of lipoprotein changes will be presented elsewhere.

Base-line Levels on Corn-oil Formula

Fig. 1 is a graphic demonstration of the data of a typical feeding-experiment. For the first 8 weeks the patient ate ad libitum. After relatively constant levels of serum-lipids had been achieved, formula feeding was begun. In the three succeeding periods, all dietary fat was derived from corn oil, coconut oil, and corn oil, respectively. There were striking decreases in all serum-lipid components during the two corn-oil periods and rises in all except triglycerides when coconut oil was fed. After each change of formula, lipid levels shifted upward or downward in an orderly manner through a 3-week transition phase. This was followed by a new steady state, a plateau of levels marked by only minor fluctuations. Body-weight remained unchanged in all periods.

Not all patients responded to the corn-oil formula in the same measure, and only occasional patients with high serum-cholesterol achieved normal levels. To compare responses to various dietary fats in different patients, it was necessary to establish in each individual a base-line of serum-lipids attained on corn-oil feeding. Then, when other fats were substituted isocalorically for corn oil in the basic formula, the serum-lipid data obtained during successive steady states could be related to the corn-oil base-line. Thus, in fig. 1, the level of total cholesterol on the coconut-oil diet was 40% higher than that on corn oil.

Measurements during transitions were, of course, omitted in these calculations. The length of each transition phase was determined on an individual basis by inspection of the assembled data. Transitions varying from 3 days to 8 weeks have been encountered, but, usually, transitions were completed in 2 to 3 weeks. Consequently, with each change in formula at least the first 2 weeks' determinations were discarded when selecting data for comparative calculations; when transitions were slower, more data were discarded.

It is relevant to define the extent of variation of week-to-week values during that terminal portion of each feeding period designated as the steady state. The duration of the steady state was at least 3 weeks and usually 4 or more. During the steady state the standard deviation of the mean level of total cholesterol, as well as of phospholipids, was less than ±20 mg. per 100 ml. serum in all cases except patient 3, and the pooled variation of the 120 steady states reported in this paper

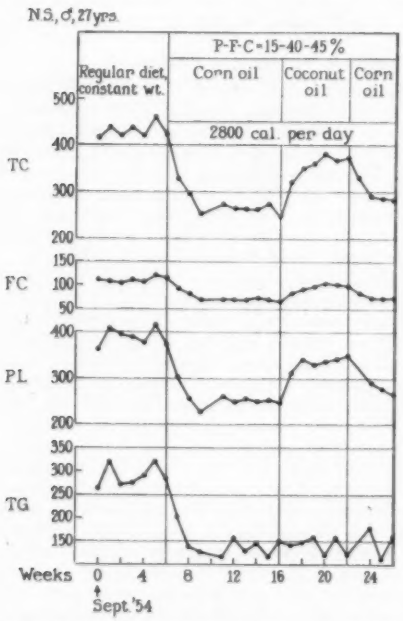

Fig. 1—26-week study of serum-lipids of patient 9, maintained at constant body-weight on ad-lib feeding, then by oral formula feeding exclusively.

TC=total cholesterol, FC=free cholesterol, PL=phospholipids, TG=triglycerides—all in mg. per 100 ml. serum. P-F-C=dietary proteins, fats, and carbohydrates, as percentages of total calories.

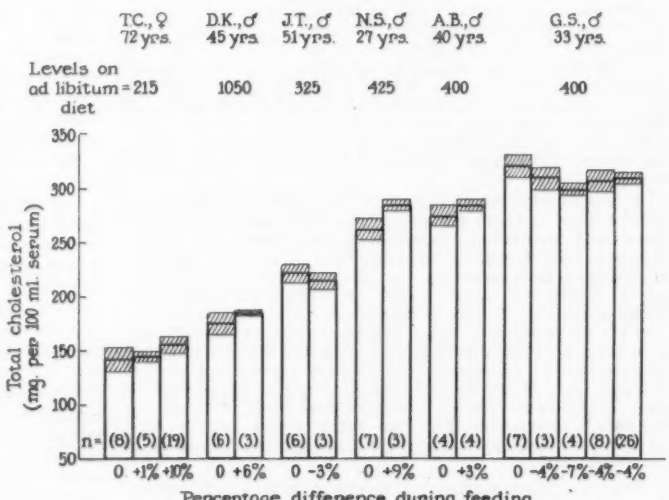
TC., ♀ 72 yrs.
D.K., ♂ 45 yrs.
J.T., ♂ 51 yrs.
N.S., ♂ 27 yrs.
A.B., ♂ 40 yrs.
G.S., ♂ 33 yrs.
Levels on ad libitum diet = 215
1050
325
425
400
400
Total cholesterol (mg. per 100 ml. serum)
n= (8) (5) (19) (6) (3) (6) (3) (7) (3) (4) (4) (7) (3) (4) (8) (26)
0 +1% +10% 0 +6% 0 -3% 0 +9% 0 +3% 0 -4% -7% -4% -4%
Percentage difference during feeding of corn oil formula in two or more isolated periods
Mean ± S.D.

Fig. 2—Reproducibility of serum-cholesterol levels in six patients (from left to right, patients 34, 1, 27, 9, 12, and 13) retested on basic corn-oil formula (P-F-C = 15-40-45%), with other regimens in intervening periods.

Bars show mean levels during steady states, hatched area one S. D. n=number of weekly data during each steady state. Percentage differences along base-line calculated with reference to mean levels of first feeding periods.

TABLE I—CLINICAL DATA AND TOTAL SERUM-CHOLESTEROL LEVELS OF PATIENTS SUBJECTED TO BASIC CORN-OIL FORMULA

(Mean cholesterol levels are shown, ± one standard deviation. Values in parentheses = number of determinations. All formula-feeding experiments conducted in metabolic ward, except for those marked *)

Patient		Clinical diagnosis	Total serum-cholesterol (mg. per 100 ml.)			Percentage decrease on formula after ad-lib. diet
No.	Sex, Age (yr.) (initials)		Ad-lib. diet (outpatient)	Corn-oil formula (inpatient)	Total vegetarian diet (no formula) (outpatient)	
1	M, 45 (D. K.)	Hl, Xs	1089 ± 59 (4)	*175 ± 10 (6)	277 ± 18 (5)	84
2	M, 42 (H. S.)	Hl, Xs	898, 895 (2)	471 ± 21 (7)	..	47
3	M, 40 (I. N.)	Hc, Xs, Xt, Ashd	787 ± 87 (9)	387 ± 16 (5)	..	51
4	F, 50 (E. M.)	Hc, Mx, Xt, Xs, Ashd, Pm	625, 625 (2)	206 ± 16 (3)	..	67
5	F, 51 (D. K.)	Hc, Xt, Ashd, Pm	533 ± 12 (3)	425 ± 20 (23)	..	20
6	F, 50 (F. R.)	Hc, Xt, Ashd, MI, Pm	502, 502 (2)	325 ± 16 (6)	..	35
7	F, 39 (F. G.)	Hc, Xt, Xs	530 ± 16 (6)	362, 360 (2)	..	31
8	M, 34 (V. F.)	Hc, Xt, Xs, Ashd	436 ± 24 (11)	*345 ± 12 (7)	..	21
9	M, 27 (N. S.)	Hc	430 ± 16 (7)	*263 ± 10 (7)	..	42
10	F, 51 (E. L.)	Hc, Xt, Pm	429 ± 30 (9)	306 ± 5 (3)	..	28
11	M, 50 (A. O.)	Hc, Xt, Xs, Ashd, MI	413 ± 29 (6)	192 ± 10 (4)	290 ± 19 (7)	53
12	M, 40 (A. B.)	Hc, Xt, Xs	400 ± 28 (9)	274 ± 9 (4)	313 ± 16 (13)	31
13	M, 34 (G. S.)	Hc, Xt, Ashd, MI	400 (1)	*321 ± 12 (7)	..	20
14	M, 37 (B. H.)	Hc, Xt, Xs	390, 411 (2)	189 ± 5 (4)	..	53
15	M, 29 (I. P.)	Hc, Xt, Ashd, MI	386, 345 (2)	363 ± 3 (3)	..	0
16	M, 13 (R. G.)	Hc	363 ± 27 (7)	195 ± 7 (8)	289 ± 25 (18)	46
17	F, 26 (B. W.)	Hc, Xt, Xs	370, 340 (2)	185 ± 6 (5)	..	47
18	M, 51 (W. J.)	Hc, Ashd, MI	358, 331 (2)	185 ± 13 (4)	218 ± 7 (4)	46
19	F, 37 (N. W.)	Hl	323 ± 20 (3)	180 ± 7 (4)	..	44
20	M, 50 (J. R.)	Hl, Ashd, MI	347 (1)	200 ± 10 (5)	..	40
21	M, 67 (M. I.)	Hc, Ashd	301, 292 (2)	180 ± 8 (5)	..	40
22	M, 41 (W. K.)	Hc, Ashd	300, 294 (2)	191 ± 8 (8)	..	36
23	M, 61 (H. K.)	Hc, Ashd, MI	298, 294 (2)	209 ± 6 (4)	259 ± 14 (24)	29
24	F, 36 (E. C.)	Hc, Xs	295 (1)	156 ± 7 (6)	..	47
25	M, 40 (S. E.)	Hc, Ashd	302, 261 (2)	198 ± 11 (5)	..	28
26	F, 62 (N. I.)	Hc, Ashd	275, 250 (2)	178 ± 7 (6)	..	30
27	M, 51 (J. T.)	Hc, Ashd, MI	259, 245 (2)	222 ± 9 (6)	..	12
28	M, 52 (H. J.)	Ashd, MI	267, 224 (2)	156 ± 8 (4)	221 ± 10 (5)	37
29	M, 55 (N. P.)	Ashd, MI	244 ± 16 (10)	161 ± 7 (6)	..	34
30	F, 46 (I. T.)	Cardiac neurosis	246, 243 (2)	119 ± 2 (4)	..	52
31	M, 53 (O. C.)	Ashd	237 ± 9 (3)	159 ± 6 (5)	176 ± 2 (3)	33
32	M, 60 (L. S.)	Ashd, MI	246 ± 11 (4)	194 ± 6 (5)	..	21
33	M, 37 (L. B.)	Ashd	225 ± 8 (3)	165 ± 4 (4)	..	22
34	F, 72 (T. C.)	Ashd, MI, Pm	208 ± 7 (5)	142 ± 11 (8)	..	32
35	F, 52 (M. W.)	Treated thyrotoxicosis, Ashd, Pm	215 ± 2 (3)	131 ± 11 (8)	..	39
36	M, 52 (E. C.)	Ashd	224, 193 (2)	152 ± 6 (3)	..	31
37	M, 52 (J. K.)	Ashd	194, 194 (2)	Experiment in progress	..	..
38	M, 32 (L. R.)	Ashd, MI	186, 170 (2)	105 ± 5 (4)	..	41
39	F, 46 (A. H.)	Sprue	152 ± 16 (3)	99 ± 7 (7)	..	35
40	F, 34 (D. B.)	Sprue	125, 117 (2)	79 ± 6 (7)	..	35

M = male. F = female. Hl = hyperlipæmia. Hc = hypercholesterolæmia. Xs = xanthomatosis of skin (tuberous or planar, or xanthelasma). Xt = xanthomatosis of tendons. Ashd = arteriosclerotic heart-disease. MI = myocardial infarction, healed. Mx = myxœdema. Pm = postmenopausal.

was ±9·9 mg. for total cholesterol, ±4·2 mg. for free cholesterol, and ±9·9 mg. for phospholipids. The deviations of each of these components were unrelated to their total mean concentration. Both technical and true biological variations (Watkin et al. 1954) of triglycerides were greater than in the case of cholesterol and phospholipids. In 95 out of 100 steady states, standard deviations of mean triglyceride levels were less than ±60 mg. per 100 ml. serum; the pooled variation in these 100 periods was ±31 mg. The deviations of triglycerides were larger at higher concentrations of this lipid component, as would be expected from the method of measurement. Independent tests showed that about one-third of the total variation of each lipid level could be ascribed to methodological error. Differences in mean cholesterol or phospholipid levels of 25 mg. per 100 ml. of serum are statistically significant at the 1% level, when 4 data are collected in each of 2 steady states under comparison and standard deviations of mean levels are ±10 mg.

It is central to the issue under discussion that the concentration of a serum-lipid during ingestion of corn oil be a reproducible constant for a given subject. The similarity of these levels in re-test periods is shown in fig. 2, in which data from six re-tested patients are graphed. It is seen that mean concentrations of serum-cholesterol varied by no more than 10% from one corn-oil period to another. In the same patients phospholipid levels varied by 7% or less from period to period, but the range of triglyceride fluctuations was as great as 50%. In patients 33 and 13 there was no drift of levels during administration of the corn-oil formula for 19 and 26 weeks, respectively, as shown by the small standard deviations of values from the mean of these periods. Thus, for the period set as a minimum in all our studies (4 to 5 months) the corn-oil base-line remained fixed and showed no "escape."

In view of the fact that serum-lipid levels can be made to vary so strikingly by simple dietary manipulations, little is gained by analysing data obtained during ad-libitum feeding when dietary intakes vary in a complex manner. Although data gathered during ad-libitum feeding periods are obviously the net result of many undefinable and conflicting dietary forces, such levels are termed "normal" when gathered from patients without manifest illness. We made no effort to collect large numbers of such data, although a few determinations of serum-lipids were made during the preliminary work-up of each case. Table I compares total serum-cholesterol levels on ad-libitum diets and during maintenance of body-weight on the basic corn-oil formula. Decreases of 20% or more were produced in thirty-six of thirty-nine patients during corn-oil formula feeding. In patient 1 a decrease of 84% was achieved, while a 12% decrease was seen in patient 27, and in patient 15 the corn-oil formula produced no change. Excepting these three cases, the percentage decreases ranged from 20–67% (mean 37%, standard deviation ±11%). These data show clearly the unpredictability of response of individual patients to a given dietary fat intake.

The Responsible Factors in Corn Oil

Experiments such as that shown in fig. 1 suggested that certain factors in the diet raised the levels of serum-lipids, and others depressed them. When corn oil was

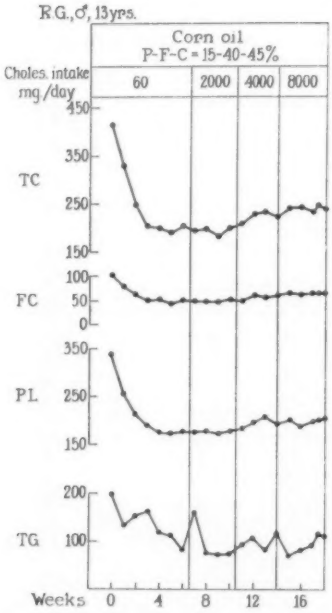

Fig. 3—Effect on serum-lipids of additions of cholesterol to the basic corn-oil formula (patient 16). Crystalline cholesterol was dissolved in warm corn oil and homogenised in the formula. Increases in cholesterol and phospholipid levels on intakes of 4 and 8 g. per day were significantly higher ($p < 0.01$) than on 0.06 and 2 g. per day, but differences were small.

fed as the sole source of dietary fat, the lowered levels could have been due to an absence of elevating factors, or to a presence or dominance of depressing factors. Since the protein and carbohydrate portions of these formulas were identical, and the total quantity of fat remained constant, the factors in question resided in the qualitative differences between dietary fats.

An obvious difference between fats of animal and vegetable origin is the presence of cholesterol in the former and of poorly absorbed plant sterols in the latter. However, experiments of the type shown in fig. 3 convinced us that the depressions of serum-lipid levels during feeding of the corn-oil formula were not due to the absence of cholesterol from that formula. Similar experiments have been carried out with a lard formula (patient 11); the ingestion of cholesterol (0·6 g. per day) with lard produced no higher levels of serum-lipids than lard alone.

Corn oil contains 2% or less of its weight as non-saponifiable material (sterols, tocopherols, carotenes, hydrocarbons, waxes, phosphatides). About half of this small fraction is mixed sitosterols. Therefore, a 65-kg. adult maintained on the basic corn-oil formula ingests a maximum of 1 g. of corn sitosterols per day. Experiments were carried out in six patients to whom large supplements of beta sitosterol § (18 g. a day) were administered in conjunction with totally vegetarian diets of solid foods. In all cases serum-lipid levels were very much higher than when the corn-oil formula was fed. These studies indicated that the beta-sitosterol content of corn oil is not chiefly responsible for the depressing effect of this oil on serum-lipid levels.

Other feeding experiments were made with oils freed of the major portion of the non-saponifiable fraction by both physical and chemical procedures. In the first, refined corn-oil was subjected to molecular distillation.‖ A 50 : 50 cut resulted in threefold enrichment of the non-saponifiable material in the distillate fraction and a threefold decrease of this material in the residue. Each fraction was fed in the basic formula at 40% of calories, as was the original undistilled oil. Serum-lipid levels remained unchanged from period to period in this 17-week test (fig. 4), despite a sixfold difference in non-saponifiable content in the two distillation fractions. Similar studies undertaken by Beveridge et al. (1957b) also showed no significant difference in the effects of undistilled corn oil and various cuts of corn oil obtained by molecular

§ Generously furnished by Eli Lilly & Co., Dr. R. E. Shipley.
‖ Molecular distillations of oils were carried out through the coöperation of Distillation Products Industries, Dr. P. L. Harris.

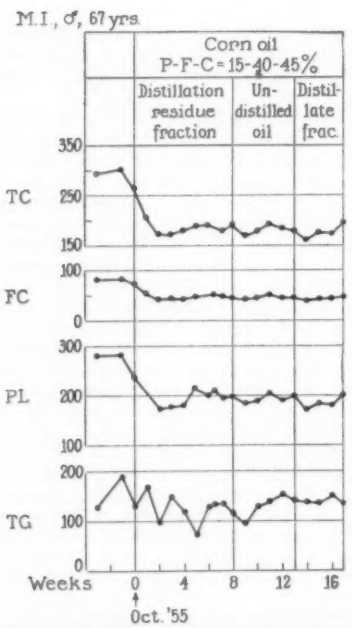

Fig. 4—Lack of dietary effect on serum-lipids (patient 21) of sixfold difference in the non-saponifiable elements of corn oil produced by molecular distillation.

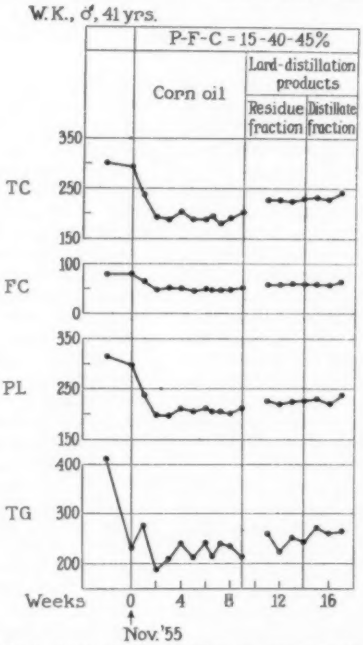

Fig. 5—Lack of dietary effect on serum-lipids (patient 22) of threefold difference in non-saponifiable elements of lard produced by molecular distillation. Levels during second and third test periods were the same, but both were higher than during corn-oil ingestion.

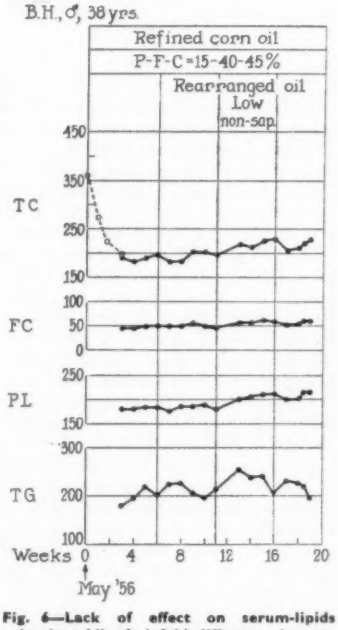

Fig. 6—Lack of effect on serum-lipids (patient 14) of sixfold difference in non-saponifiable elements of corn oil produced by chemical extraction. Comparison of first and second periods shows that random rearrangement of corn-oil fatty acids produced no significant changes.

TABLE II—COMPOSITION DATA ON FATS AND OILS USED IN FORMULA-FEEDING EXPERIMENTS

Fatty-acid compositions listed as percentages of total fatty acids. Data derived from spectrophotometric analysis after alkali isomerisation and from iodine values. *Trans* acids obtained by infra-red analysis. Analyses performed as follows: GM = General Mills, Inc. (D. H. Wheeler); EURB = Eastern Utilisation Research Branch, U.S. Department of Agriculture (R. W. Riemenschneider); DPI = Distillation Products Industries (P. L. Harris); P & G = Procter & Gamble (F. H. Mattson)

No.	Oil or fat	Description and origin	Analysis by	Iodine value	% Saturated acids	% Oleic	% Linoleic	% n.s.	% *trans* monoethenoid	% *trans* di-ethenoid	% Conjugated diene	Melting-point
1	Beef tallow	Oleo oil, Cudahy	GM	46·8	47·6	50·1	2·3	..	..	..	..	..
			GM	47·6	45·2	49·2	2·3	..	..	..	..	..
2	Butter oil	University of Wisconsin Agricultural College (H. C. Jackson)	GM	39·5	57·8	38·3	3·9	..	..	..	..	..
3	Chicken fat	Ocoma Foods Co.	GM	86·5	23·4	52·9	23·7	..	..	..	..	..
4	Cocoa-butter	Tower Brand	GM	36·6	60·1	37·0	2·9	..	..	..	..	..
5	Coconut oil	E. F. Drew & Co.	GM	9·7	90·7	7·3	2·0	..	..	..	..	..
6	Corn oil	C.P., winterised	GM	126·8	8·8	35·5	55·7	..	..	..	..	..
7	Corn oil	C.P., hydrogenated	EURB	79·8	18·0	48·9	6·2	1·22	21·1	4·7	..	34–35°C.
8	Corn oil	C.P., hydrogenated	EURB	57·7	34·4	33·1	0·0	1·16	31·4	0·8	..	44–47°C
9	Corn oil	C.P., m.d.-distillate	DPI	123·2	..	..	..	1·91	..	..	..	..
10	Corn oil	C.P., m.d.-residue	DPI	129·0	..	..	..	0·32	..	..	..	..
11	Corn oil	E. F. Drew & Co.	GM	125·9	9·0	36·1	54·9	1·2	4		..	..
12	Corn oil	E. F. Drew & Co., random rearranged	GM	124·1	10·6	35·3	54·1	..	4		..	..
13	Corn oil	E. F. Drew & Co., rearranged, low n.s.	GM	119·6	12·6	36·1	51·3	0·2	7		10	..
14	Cottonseed oil	Procter & Gamble	P & G	105·8	26·7	25·4	47·5	0·42	..	..	..	..
15	Cottonseed oil	Procter & Gamble, hydrogenated	P & G	68·1	25·5	70·2	4·6	0·59	32		..	29–36°C
			EURB	67·4	26·4	69·1	4·3	..	..	..	..	..
16	Lard	Cudahy, prime steam	GM	70·0	33·1	52·9	13·5	..	..	..	..	..
17	Lard	Cudahy, m.d.-distillate	P & G	67·4	36·1	51·3	12·2	0·20	..	..	0·2	..
18	Lard	Cudahy, m.d.-residue	P & G	68·2	33·2	55·1	8·9	0·07	..	..	2·3	..
19	Lard	R.I.	EURB	89·4	30·3	37·8	30·5	0·12	..	..	..	..
20	Lard	R.I.	EURB	51·5	42·8	55·0	1·8	0·20	..	..	..	..
21	Lard	Procter & Gamble	P & G	66·5	37·7	49·4	12·3	0·28	0·7		0·2	..
22	Lard	P & G, random rearranged	P & G	66·7	37·3	50·5	11·3	0·78	0·6		0·2	..
23	Lard	P & G, directed interesterification	P & G	94·5	9·5	71·3	18·0	1·8	0·9		0·6	..
24	Olive oil	Ehmann Olive Co.	GM	89·7	2·9	89·5	7·6	..	..	..	..	..
25	Palm oil	Durkee Famous Foods	EURB	53·1	50·1	39·1	9·9	..	..	..	..	..
		Borden Co.	GM	53·6	47·3	42·9	9·8	..	..	..	..	..
26	Peanut oil	Planters (A. C. Eaton)	GM	93·0	17·7	56·5	25·8	..	..	..	..	..
27	Safflower-seed oil	E. F. Drew & Co.	GM	144·3	5·7	21·7	72·6	..	..	..	..	..
28	Sesame oil	Welch, Holme, & Clark	GM	113·0	11·8	45·4	42·8	..	..	..	..	..

C.P. = Corn Products. R.I. = Rockefeller Institute. n.s. = non-saponifiable fraction. m.d. = molecular distillation.

distillation. A second experiment was conducted with two fractions obtained in a 50 : 50 cut of lard by molecular distillation. In an 18-week test the lowest lipid levels were reached on formulas containing corn oil (fig. 5). Higher levels were found when the two lard fractions were fed (see below), but the feeding of residue and distillate fractions produced no significant differences in levels despite threefold differences in their contents of non-saponifiable materials.

The chemical procedure consisted of saponification of the refined corn oil, formation of the insoluble barium soaps, and extraction of these soaps with ethylene dichloride four times to concentrate the non-saponifiable materials in the extract.¶ The acids were regenerated and re-esterified with glycerol. Excess acids and catalysts were washed out before final deodorisation. In this process the content of non-saponifiable material was reduced from 1·2 to 0·2%. Since the reconstructed oil consisted of corn-oil fatty acids arranged at random on the glycerol base, it was necessary as a preliminary control step to show that randomisation of fatty acids did not produce a different effect on serum-lipids from that of the naturally constituted corn-oil glycerides. Therefore, in a 20-week test (fig. 6) a patient was fed refined corn oil in the first period, then the same oil after random rearrangement in the second and fourth periods, and the rearranged corn oil poor in non-saponifiables in the third period. It is seen that the effectiveness of corn oil was not significantly changed by chemical removal of a large portion of the non-saponifiable material. The lack of effect of randomisation is hardly surprising in the light of previous experiments on digestion and absorption in man (Ahrens and Borgstrom 1956).

Thus, three lines of investigation failed to show that the factors responsible for depressing serum-lipid levels reside in the non-saponifiable, non-glyceride portion of corn oil. On the contrary, the various lines of evidence suggested that the glycerides themselves contained the sought-for factors. Further experiments using fats and oils which varied in fatty-acid composition were carried out in order to test this conclusion.

Variations in Fatty-acid Composition

A number of informative tests has been carried out by substituting various natural fats and oils for corn oil in the basic formula. These fats were chosen to obtain wide variations in fatty-acid composition. The chemical characteristics of the fats used are shown in table II.** Except in the cases of butter and coconut oil, all fats fed were composed of fatty acids of similar chain length (predominantly C_{16} to C_{18}). To simplify the interpretation of such experiments, oils rich in trienes were purposely avoided (soybean, linseed oils).

The levels of serum-lipids produced by the feeding of each of these fats are set forth in table III. Calculations were made of the absolute and percentage differences of these levels from the base-line levels reached during the feeding of corn oil. The results were related to a number of characteristics of natural fats—iodine number, linoleic-acid content, and biological activity in rats deficient in

¶ Chemical purifications of corn oil were generously accomplished by E. F. Drew & Co., Dr. V. K. Babayan.

** We are greatly indebted to Dr. Donald H. Wheeler, General Mills, Inc., to Dr. Roy W. Riemenschneider and Dr. Waldo C. Ault, Eastern Utilisation Research Branch, U.S. Department of Agriculture, and to Dr. Fred Mattson, Procter & Gamble Co., for numerous analyses and for their helpful advice on matters of fat technology.

essential fatty acids.†† Absolute differences in lipid levels failed to correlate with any of these parameters. However, a roughly linear relationship was obtained by relating percentage differences in cholesterol or phospholipid levels to the iodine values of the fed fats. This analysis is shown in fig. 7. The use of fats with iodine values below 90 produced levels of cholesterol significantly higher than the corn-oil base-line ($P<0.01$) in 23 of 26 tests. However, fats with iodine values over 100 all produced equally low levels of cholesterol, suggesting a limit to the effect produced by the ingestion of unsaturated fats. With the feeding of fats with iodine values below 90, the cholesterol content of the serum increased as the saturation of the dietary fat increased. The plot of the phospholipid data showed the same type of correlation with a somewhat smaller dispersion of data. In the case of the triglycerides there was no correlation with iodine value, all percentage differences falling within the $\pm 25\%$ limits of reproducibility noted above in the analysis of the corn-oil refeeding tests.

Statistical analysis showed a significant correlation between P (the percentage decrease of total-cholesterol or phospholipid levels with a given dietary fat, relative to the corn-oil base-line) and the total iodine values of the fats fed. An equally good correlation was found between P and the expression: total saturated acids minus linoleic acid (S − L). Since our studies were performed with fats consisting almost exclusively of saturated (S), oleic (O), and linoleic (L) acids, it was simple to calculate that the iodine values of these fats are functions of any of the following expressions: (S − L), (2S + O), or (2L + O). Thus I_T (total iodine value) $= 90 - 0.9\ (S - L)$, and $(S - L) = 10 - 1.11\ (I_T)$. With the natural fats available for feeding tests the variable (2S − L) also is practically a linear function of iodine value.

Now, if our data can be correlated with iodine value they will also be correlated with any of the four alternative expressions. To conclude that dietary oleic acid is neutral or lacking in effect simply because the cholesterol data can be correlated with some function of (S − L) or (2S − L) is no more correct than to imply that linoleic is unimportant because the data can be correlated with the expression (2 S + O). Correlations which utilise any of these modes of expression are no more meaningful than an iodine-value correlation.

An analysis of variance was carried out to assess the relative importance of total unsaturation and the linoleic-acid content of the various fats. The linear regression of P on total iodine value of the dietary fats (I_T) was $P = -0.37\ I_T + 44$. The multiple regression of P on I_T and on linoleic acid, expressed in iodine-value equivalents ($I_L = L \times 1.8$) was $P = 0.14\ I_L - 0.49\ I_T + 47$. Comparison of residual variances showed that the multiple regression gave no better fit to the experimental data than the simple regression on total iodine value. The simple regression of P on I_L gave a poorer fit than either of these ($P<0.05$).

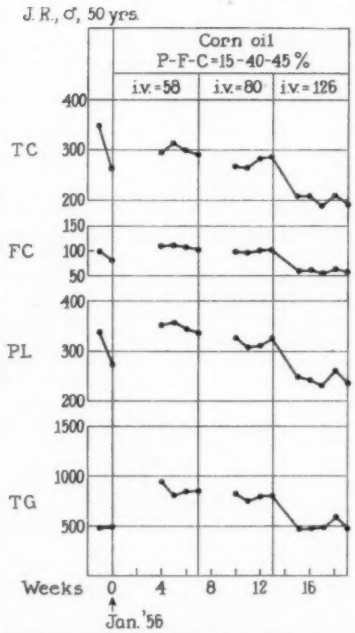

Fig. 8—Effect in patient 20 of ingestion of corn oil hydrogenated to iodine values of 58 and 80, compared to unhydrogenated oil. Levels of lipids significantly different ($P<0.01$), in three test periods.

It is noted that the butter and coconut-oil data contribute heavily to the values of the regression coefficients. Since it will be shown below that these fats may cause unusual effects on serum-cholesterol, perhaps due to their high content of short-chain fatty acids, it may be questioned whether it is permissible to include these data in the mathematical analysis. Indeed, if they are excluded, the following regressions are calculated: $P = -0.21\ I_L + 0.08\ I_T + 13$; $P = -0.16\ I_T + 24$; $P = -0.15\ I_L + 17$. No significant differences were found between the residual variances of these three regressions (F test). Comparison of these formulas with those given in the preceding paragraph suggests that the assembled data fall along two curves, a steep one in which the major factor is correlated with mean unsaturation, and a flat curve in which the content of short-chain saturated fatty acids may be the dominant factor.

It is a matter of great practical and theoretical interest to learn whether the observed effects of dietary fats on serum-lipids are caused by mean unsaturation, or by the content of a specific unsaturated acid such as linoleic acid, but it is clear that this issue cannot be resolved by tests made with commonly occurring natural fats. The fatty-acid compositions of these fats are so constituted that there is great interdependence between I_T and L. In fact, the coefficient of correlation (r) between I_T and L of all fats used in this study, excluding butter and coconut oil, is 0.88 ± 0.09 ($P<0.01$). When butter and coconut oil are included, $r = 0.79 \pm 0.12$ ($P<0.01$), also a high degree of correlation. If I_T and L are to be separately evaluated, it is obvious that tests must be

†† A number of bio-assays on fats used in these tests were generously performed by Dr. H. J. Thomasson, Unilever Research Laboratory, Holland, by the methods described in *Internat. Rev. Vitamin Research*, 1953, **25**, 62.

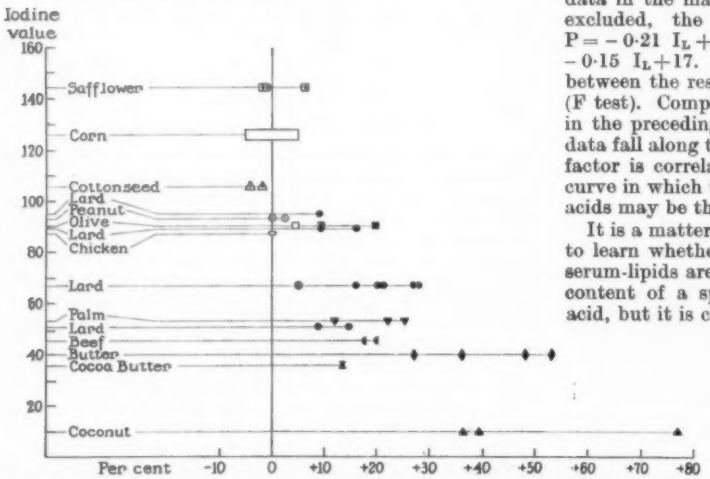

Fig. 7—Relationship between iodine values of dietary fats and serum-cholesterol levels, expressed as percentage differences from base-lines established during ingestion of corn oil.

Iodine values of fats listed along vertical axis. Open bar at I. v. 126 = estimated reproducibility of corn-oil base-line (fig. 2). Open symbols represent results not significantly different from base-line, solid symbols different at level of $P<0.01$, hatched symbols different at level of $P<0.05$.

made with fats synthesised from pure acids. The hypotheses suggested by our calculations can be critically evaluated only when I_T is held constant and L varies maximally, and vice versa. It is idle at this time to carry the interpretations of the present data further than to state that the effect on serum-cholesterol and phospholipid levels is strongly correlated with the iodine value of dietary fat.

Hydrogenated Fats

If unsaturation of fatty acids is responsible for the effects under study, the obliteration of double bonds by hydrogenation would be expected to mitigate the depressing action of these acids. Complete hydrogenation of such long-chain fatty-acid oils as corn or cottonseed produces triglycerides composed of palmitic and stearic acids—fats with high melting-points which are poorly absorbed by the small intestine (Deuel 1954). To insure complete absorption of the fed fat the investigator is forced to use partially hydrogenated oils with melting-points below 50°C. Partial hydrogenation is, however, not a simple process, and isomers are formed as well as simple hydrogen addition products (Sreenivasan and Brown 1956). The nutritional effects of partially hydrogenated oils have received extensive study (Deuel 1954), and in terms of growth, maturation, and reproduction such fats are equivalent to their natural precursors. However, in terms of the parameters under study here the effects of these complicated mixtures are unknown. Since *trans* acids do not replace *cis* acids in remedying essential-fatty-acid deficiency (Holman 1951, Privett et al. 1955) it seems probable that the isomers found in partially hydrogenated fats are metabolised through different pathways.

Three feeding tests were carried out with partially hydrogenated oils, fed in the basic formula as 40% of calories. The most clear-cut response was shown by patient 20 (fig. 8) in whom the feeding of corn oils, hydrogenated to iodine values of 80 and 58 in a moderately selective process, produced progressively higher levels of cholesterol and phospholipids in the serum. In patient 30, however, the ingestion of corn-oil, hydrogenated to an iodine value of 80, produced no higher levels of serum-lipids than the unhydrogenated oil. In patient 18, serum-lipids were equally depressed on unhydrogenated corn and cottonseed oils, but the subsequent feeding of cottonseed oil, hydrogenated to an iodine value of 68 in a selective manner, produced a small but significant rise ($P<0.01$) in cholesterol and phospholipid levels. The compositions of these products are listed in table II, and the serum-lipid data in table III. It is worth emphasising that in these 3 patients the entire fat intake consisted of fats hydrogenated more heavily than in the case of the margarines and shortenings commonly marketed in the United States (Sreenivasan and Brown 1956), yet in two of three cases serum-lipid levels were not so high as those found during ad-libitum feeding.

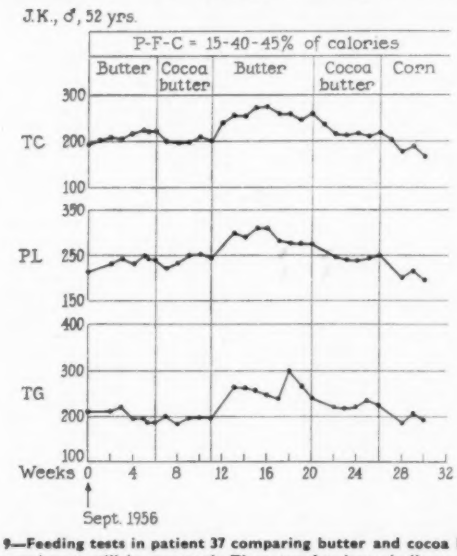

Fig. 9—Feeding tests in patient 37 comparing butter and cocoa butter (experiment still in progress). These two fats have similar contents of saturated, oleic, and linoleic acids (table II, fig. 11), but butter is rich in C_4-C_{14} fatty acids.

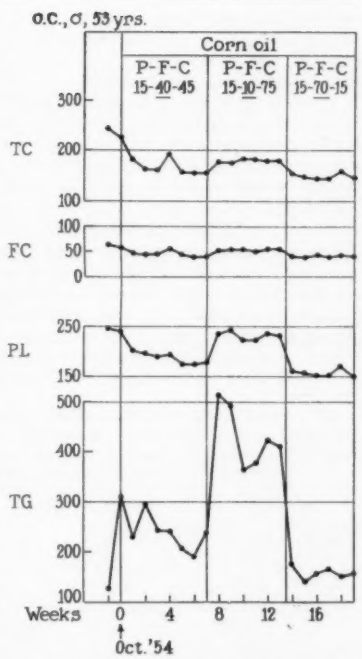

Fig. 10—Effect on serum-lipids (patient 31) of varying the proportions of fat and carbohydrate calories reciprocally, keeping total calories, protein, and body-weight constant. Major changes in triglycerides, smaller differences in phospholipids, and least striking effects on cholesterol. Lowest serum-lipids on highest intake of corn oil, highest levels on lowest intake.

Variations in Length of Fatty-acid Chains

The highest lipid levels encountered in our tests were produced by the feeding of butter and coconut oil (fig. 7). While these oils were the most saturated of the dietary fats tested, it must be stressed that they were also the only fats which contained a high content of fatty acids with chain lengths less than C_{16}. 25% of butter fatty acids have chain lengths of C_4 to C_{14}, while 60% of coconut-oil fatty acids have chain lengths of C_8 to C_{14}. Thus, it is possible that the effectiveness of these fats in raising serum-lipid levels is due in part to the low content of unsaturated acids but also to the presence of short-chain acids.

Experiments have been completed in patients 26 and 37 which were designed to test the importance of chain length as a variable. In these tests butter was compared with cocoa-butter. These fats are almost identical in iodine value and in percentage composition of saturated, oleic, and linoleic acids (table II). However, the saturated acids of cocoa-butter are predominantly C_{16} and C_{18} acids, whereas 40% of the saturated acids of butter are C_4 to C_{14} acids. Serum-cholesterol and phospholipid levels were significantly higher ($P<0.01$) during butter-feeding periods in both patients (fig. 9). The fats were apparently equally well absorbed, as evidenced by the constancy of body-weights over the many weeks of these tests when the formulas were isocalorically exchanged.

These results are interpreted as presumptive evidence that fatty acids of short and intermediate chain length cause higher lipid levels in the serum than do the long-chain saturated acids. The short-term feeding tests carried out by Beveridge et al. (1957b) with fractions of butter prepared by molecular distillation seem to

confirm this postulate. Their highest cholesterol levels were produced by the fractions of butter containing the shortest and most saturated fatty acids. However, in both laboratories' experiments the non-glyceride portions of the test fats also differed. Therefore, final proof of this point awaits use of fats synthesised from pure fatty acids. It seems clear that butter and coconut oil are not ideal prototypes of highly saturated fats for our experiments because of inhomogeneity in chain length of their fatty acids.

Variations in Caloric Mixture

The response of patients to any given dietary fat is influenced not only by the chemical structure of the fat but also by the proportional contribution of fat to the total caloric intake. These relationships are complex (fig. 10). When only 10% of total calories was fed as corn oil, serum-lipid levels were significantly higher in all categories than when 40% or 70% of calories were derived from corn oil. In fact, the lowest serum levels were attained on the highest fat intake. Similar findings were made in three other patients. This may be related to the presence in corn oil of factors which depress serum-lipid levels, but clearly the proportions of non-fatty elements in the diet also may play an important modifying rôle. It is important to note that the substitution of carbohydrate for fat calories produced major changes in the serum-triglyceride levels, other lipids increasing less strikingly. The regularity and dominance of this triglyceride response in all four patients contrasts with the lack of orderly change in this fraction in experiments where metabolic mixtures were held fixed while fats of varying fatty-acid composition were exchanged.

Discussion

The results discussed above favour the hypothesis that serum lipids can be lowered by ingestion of highly

TABLE III—SERUM-LIPID DATA DURING STEADY STATES ON INGESTION OF VARIOUS DIETARY FATS

(Patient numbers refer to list in table I. All food intake by method of oral formula-feeding. In all cases, just enough calories were fed to maintain constant body-weight. Protein calories were uniformly 15% of the total, fat and carbohydrate calories varying reciprocally as designated in third column. Means, ±1 standard deviation, are shown in all cases)

Patient no.	Dietary fat	% of calories	n	Steady state data (mg. per 100 ml. serum)			
				Total cholesterol	Free cholesterol	Phospholipids	Triglycerides
1	Corn	40	6	175 ± 10·2	47 ± 3·2	215 ± 8·0	306 ± 45
	Corn	40	3	185 ± 2·0	53 ± 2·0	214 ± 2·0	267 ± 25
2 †	Butter	40	5	719 ± 29·0	285 ± 11·8	655 ± 25·2	2968 ± 131
	Corn	40	7	471 ± 21·2	197 ± 9·6	495 ± 21·7	2403 ± 206
3	Corn	40	5	387 ± 16·2	136 ± 8·4	383 ± 24·3	722 ± 80
	Safflower-seed	40	3	377 ± 29	131 ± 9·0	355 ± 29	707 ± 107
5 †	Olive	40	4	530 ± 6·7	..	460 ± 13·5	427 ± 36
	Corn	40	23	425 ± 19·8	..	358 ± 18·9	341 ± 28
6	Corn	40	6	325 ± 15·7	82 ± 6·6	260 ± 11·5	166 ± 16·3
	Palm	40	4	406 ± 6·9	..	316 ± 2·1	192 ± 19·4
	Lard	40	5	417 ± 8·9	..	341 ± 7·4	185 ± 24·5
	Palm	40	3	396 ± 3·8	..	330 ± 8·0	207 ± 14·5
9	Corn	40	7	263 ± 9·8	69 ± 2·0	249 ± 10·2	143 ± 20·2
	Coconut	40	5	367 ± 12·6	98 ± 4·0	340 ± 7·1	142 ± 18·7
	Corn	40	3	286 ± 4·1	72 ± 0·7	278 ± 12·0	151 ± 35
11	Corn	40	4	192 ± 10·2	48 ± 4·0	200 ± 8·9	258 ± 19·9
	Corn + cholesterol	40	6	198 ± 13·3	45 ± 3·9	200 ± 14·1	268 ± 26
	Lard + cholesterol	40	4	261 ± 11·4	73 ± 5·0	251 ± 9·2	307 ± 18·2
	Lard + egg-yolk	40	4	278 ± 13·7	76 ± 8·0	257 ± 11·7	287 ± 32
	Lard	40	4	248 ± 4·6	70 ± 2·4	240 ± 15·6	272 ± 22·0
12	Corn	40	4	274 ± 9·1	69 ± 3·6	219 ± 7·0	102 ± 9·0
	Olive	40	3	327 ± 5·0	86 ± 4·1	267 ± 6·5	104 ± 21·8
	Corn	40	4	285 ± 4·7	77 ± 2·2	230 ± 4·2	126 ± 8·6
13 †	Corn	40	7	321 ± 11·5	70 ± 4·4	260 ± 15·8	238 ± 28
	Corn	70	7	314 ± 8·7	76 ± 7·0	259 ± 7·4	187 ± 17·7
	Corn	40	3	309 ± 13·3	72 ± 4·4	263 ± 13·7	178 ± 14·7
	Corn	10	7	298 ± 12·3	76 ± 5·2	272 ± 9·0	228 ± 28
	Corn	70	7	303 ± 15·4	73 ± 3·4	258 ± 10·0	189 ± 10·2
	Corn	40	4	298 ± 5·5	73 ± 1·9	260 ± 10·0	220 ± 35
	Corn	40	8	307 ± 10·2	74 ± 2·9	263 ± 7·7	215 ± 27
	Corn	40	26	308 ± 6·9	75 ± 5·4	254 ± 8·3	232 ± 28
	Safflower-seed	40	7	319 ± 7·6	..	261 ± 10·7	251 ± 39
	Corn	40	7	307 ± 8·8	..	259 ± 7·1	222 ± 19·7
	Cottonseed	40	7	314 ± 10·2	..	261 ± 8·0	266 ± 65
14	Corn	40	4	189 ± 5·3	46 ± 2·1	180 ± 2·1	199 ± 15·8
	Corn (rearranged)	40	4	197 ± 10·0	49 ± 4·0	185 ± 3·3	210 ± 12·4
	Corn (rearranged—low n.s.)	40	4	220 ± 7·2	57 ± 2·6	207 ± 5·2	224 ± 19·7
	Corn (rearranged)	40	5	219 ± 6·4	57 ± 3·0	210 ± 6·5	210 ± 14·0
15	Chicken	40	4	366 ± 7·5	..	288 ± 4·7	233 ± 22·0
	Olive	40	4	379 ± 4·4	..	320 ± 10·7	279 ± 34
	Corn	40	3	363 ± 3·0	..	304 ± 4·9	235 ± 22·1
16	Corn	40	8	195 ± 6·6	48 ± 3·1	177 ± 5·6	105 ± 38
	Corn + 4 g. cholesterol daily	40	3	226 ± 5·0	57 ± 2·0	199 ± 8·2	102 ± 16·9
	Corn + 8 g. cholesterol daily	40	4	238 ± 6·3	62 ± 1·4	197 ± 6·3	100 ± 15·8
17	Lard	40	3	214 ± 16·7	56 ± 4·5	237 ± 11·6	141 ± 3·5
	Corn	40	5	185 ± 5·7	45 ± 1·8	200 ± 1·5	119 ± 14·3
18	Corn	40	4	185 ± 12·9	50 ± 3·3	191 ± 8·5	133 ± 18·5
	Cottonseed (I.V.106)	40	4	177 ± 11·2	45 ± 2·5	182 ± 12·2	148 ± 13·4
	Cottonseed (I.V.68)	40	5	217 ± 7·6	57 ± 3·4	203 ± 7·2	147 ± 13·1
19	Corn	40	4	180 ± 6·8	43 ± 1·0	195 ± 6·6	192 ± 17·6
	Palm	40	3	201 ± 8·0	51 ± 3·0	205 ± 5·5	171 ± 10·0
	Lard	40	3	189 ± 6·5	48 ± 2·1	195 ± 13·3	220 ± 33
20	Corn (I.V.58)	40	4	298 ± 10·0	105 ± 3·6	345 ± 9·5	853 ± 57
	Corn (I.V.80)	40	4	273 ± 3·4	97 ± 2·2	315 ± 9·1	781 ± 31
	Corn (I.V.126)	40	5	200 ± 9·6	59 ± 3·6	243 ± 11·4	504 ± 49

unsaturated oils. The salient points supporting this contention are :

(1) Feeding-tests with dietary fats rectified in various ways suggest that the major influence on serum-lipid levels is exerted by the glycerides, not the non-saponifiable fraction.

(2) The lowest serum-lipid levels were seen when corn oil, safflower-seed oil, or cottonseed oil constituted the sole dietary fats. Higher levels were found with all other fats tested. The differences in these levels are directly related to the degree of saturation of the glyceride fatty acids as measured by the iodine value of the fat.

(3) Use of hydrogenated corn and cottonseed oils as sole dietary fats resulted in higher serum-lipid levels than when the corresponding unhydrogenated oils were fed.

The experiments of Kinsell and Michaels (1955), Bronte-Stewart et al. (1956), and Beveridge et al. (1956) produced qualitative data which accord with this hypothesis. It is noteworthy that, despite major differences in experimental design, the investigations of four groups led to the same tentative conclusions. Thus, the same type of response in serum-cholesterol levels was obtained when unsaturated fats were substituted for saturated fats in the diets of young normocholesteræmic medical students, vitamin- and protein-deficient normocholesteræmic Bantus, and Americans with and without high serum-cholesterol levels and arteriosclerotic heart-disease. Three groups kept caloric intakes and proportions of foodstuffs in the diet unchanged in comparative feeding periods; the South African experiments yielded qualitatively similar results even though these controls were lacking.

In our investigations the number of patients studied was limited by the long duration of the feeding tests, but

TABLE III—SERUM-LIPID DATA DURING STEADY STATES ON INGESTION OF VARIOUS DIETARY FATS—*continued*

Patient no.	Dietary fat	% of calories	n	Steady state data (mg. per 100 ml. serum)			
				Total cholesterol	Free cholesterol	Phospholipids	Triglycerides
21	Corn (D.P.I. residue)	40	8	185 ±14·1	47 ± 3·2	194 ±15·5	119 ±21·1
	Corn	40	5	180 ± 8·2	46 ± 5·8	193 ± 7·7	130 ±16·0
	Corn (D.P.I. distillate)	40	4	175 ±14·8	44 ± 4·2	185 ±12·2	139 ± 7·6
22	Corn	40	8	191 ± 7·7	49 ± 2·4	203 ± 5·2	224 ±14·6
	Lard (D.P.I. residue)	40	4	226 ± 2·1	58 ± 1·0	222 ± 4·5	244 ±15·5
	Lard (D.P.I. distillate)	40	3	233 ± 7·8	59 ± 3·0	227 ± 9·0	265 ± 5·7
24	Egg-yolk, butter (1 : 2)	40	6	286 ±16·1	78 ± 6·3	262 ±11·9	202 ±33
	Corn	40	6	156 ± 7·4	40 ± 4·8	165 ± 6·9	170 ±19·1
26†	Corn	40	6	178 ± 7·3	45 ± 4·8	202 ±14·7	368 ±34
	Cocoa-butter	40	4	202 ± 8·7	55 ± 4·9	241 ± 5·8	420 ±61
	Butter	40	5	242 ± 7·9	..	247 ± 9·1	363 ±15·5
	Corn	40	5	200 ± 4·5	..	206 ± 4·6	257 ±34
	Butter	40	5	262 ±11·2	..	256 ± 9·7	308 ±26
27	Corn	40	6	222 ± 8·9	62 ± 3·7	222 ±10·6	300 ±42
	Lard (R.I.) (I.V.89)	40	4	240 ± 4·6	67 ± 2·5	248 ± 4·5	369 ±19·4
	Lard (R.I.) (I.V.52)	40	4	251 ± 9·9	75 ± 5·1	264 ± 7·6	411 ±76
	Corn	40	3	216 ± 8·2	63 ± 4·9	237 ± 4·7	416 ± 3·6
28	Coconut	40	4	213 ±13·7	52 ± 2·8	209 ± 5·9	177 ±21·9
	Corn	40	4	156 ± 7·9	37 ± 2·5	168 ± 9·3	218 ±32
29	Beef tallow	40	3	189 ± 8·6	46 ± 2·7	219 ± 3·5	215 ±49
	Corn	40	6	161 ± 6·6	39 ± 2·7	185 ± 4·0	196 ±22·9
30	Corn (I.V.126)	40	4	119 ± 1·5	27 ± 0·8	164 ± 6·5	107 ± 2·2
	Corn (I.V.80)	40	4	125 ±11·5	29 ± 2·0	172 ± 5·0	118 ±27
31	Corn	40	3	155 ± 0	39 ± 3·1	175 ± 2·4	212 ±24·2
	Corn	10	5	179 ± 2·8	51 ± 2·1	230 ± 8·6	393 ±29
	Corn	70	5	146 ± 5·9	38 ± 2·1	155 ± 8·5	154 ± 9·2
32	Lard (R.I.) (I.V.52)	40	4	209 ± 9·9	58 ± 3·9	230 ±14·2	279 ±56
	Lard (R.I.) (I.V.89)	40	5	225 ± 7·8	69 ± 2·1	241 ±13·8	272 ±13·9
	Corn	40	5	194 ± 6·0	50 ± 2·4	213 ±12·1	285 ±21·2
	Corn	70	4	185 ± 8·6	46 ± 3·1	180 ± 7·6	202 ±15·2
33	Lard (P & G)	40	4	199 ± 6·0	198 ± 5·5	208 ±28	..
	Lard (P & G) (randomised)	40	3	197 ± 3·1	206 ± 7·6	210 ±34	..
	Lard (P & G) (directed interesterified)	40	4	179 ± 6·9	193 ±10·9	222 ±42	..
	Corn	40	4	165 ± 4·4	179 ± 6·6	201 ±20	..
34†	Corn	40	8	142 ±11·3	38 ± 2·5	198 ±10·3	335 ±38
	Peanut	40	4	126 ± 5·8	32 ± 4·1	190 ± 4·5	344 ±34
	Corn	40	5	144 ± 3·6	38 ± 1·5	211 ±10·9	395 ±52
	Butter	40	6	188 ± 7·6	54 ± 2·8	241 ± 8·5	402 ±34
	Corn	40	19	157 ± 8·3	42 ± 2·5	196 ±16·2	319 ±39
	No fat, P-15 %, C-85 %	0	5	177 ±11·0	61 ± 3·9	277 ±17·8	760 ±82
	Corn	10	7	159 ± 4·2	49 ± 2·2	249 ± 9·1	584 ±48
	Corn	10	5	153 ± 6·1	49 ± 2·3	237 ± 9·4	561 ±66
	Corn	70	11	186 ±10·8	49 ± 3·9	189 ± 7·7	204 ±28
35	Beef tallow	40	9	157 ± 7·8	43 ± 3·2	207 ±23·3	199 ±56
	Corn	40	8	131 ±10·6	..	168 ±14·4	153 ±23
36	Peanut	40	6	156 ± 5·4	34 ± 1·4	180 ± 5·5	174 ± 5·8
	Olive	40	5	166 ± 7·0	38 ± 3·1	174 ± 6·9	167 ±11·9
	Corn	40	3	192 ± 5·8	33 ± 2·6	167 ± 7·5	177 ±31
37†	Butter	40	4	219 ± 2·5	..	241 ± 8·4	191 ± 5·0
	Cocoa-butter	40	4	200 ± 5·8	..	243 ± 8·6	194 ± 6·6
	Butter	40	7	259 ± 9·8	..	287 ±15·8	259 ±21
	Cocoa-butter	40	5	211 ± 2·5	..	244 ± 5·6	225 ± 5·7
38	Corn	40	4	105 ± 4·9	23 ± 3·0	138 ± 7·6	129 ±14·7
	Coconut	40	5	186 ±10·1	42 ± 3·9	200 ±11·8	132 ±39
	Safflowerseed	40	4	111 ± 8·6	22 ± 3·4	144 ± 7·3	129 ±46
40	Corn	20	4	95 ± 9·3	20 ± 2·1	119 ± 4·9	137 ±23·7
	Corn	40	7	79 ± 5·9	..	..	..

* Daily cholesterol intake = 600 mg. † = Experiment still in progress. n = number of weekly data during steady state.
n.s. = non-saponifiable content. D.P.I. = molecularly distilled oil, 50 : 50 cut.

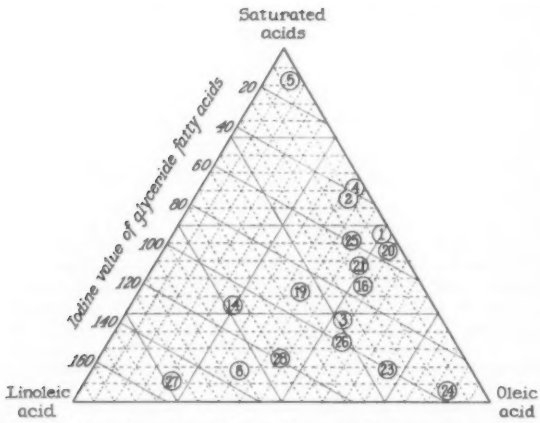

Fig. 11—Triangular plot of fatty-acid compositions of fats used in present studies.

Corners represent 100% of linoleic, oleic, and total saturated acids, respectively, while sides represent 0% of the component in the opposite corner. Fatty-acid mixtures having the same iodine value are joined in a series of parallel lines; iodine values of the glycerides composed of these acids are about 5% lower than those shown. Numbers in circles refer to fats listed in table II.

our design allowed a quantitative comparison of the effects of various dietary fats. Minimum feeding-periods of 5 weeks for each diet made possible the accumulation of serum-lipid data after steady states were reached, and minimum study-periods of 4 months provided data from several steady states in each patient. During these periods all the major lipid classes in serum were measured at weekly intervals, affording for the first time a total analysis of the serum-lipid picture. The base-line data obtained during the feeding of the corn-oil formula served as a common denominator when it was desired to compare quantitatively the varying responses of patients to other dietary fats. The use of this common denominator was validated by the finding that patients' lipid levels returned to the same point whenever they ingested this oil. It is probable that any dietary fat may serve the same purpose, for in a limited number of refeeding trials other fats and oils also have evoked serum-lipid responses which were reproducibly characteristic of the fat fed.

This quantitative technique has provided evidence which strongly suggests that the effect of dietary fats on serum-cholesterol and phospholipid levels is a function of their iodine value. It cannot be stated at present if this effect is more dependent on mean unsaturation of the fed fat than on its content of a specific unsaturated acid, such as linoleic; this issue remains to be clarified in future experiments. Whether linseed oil (rich in triethenoid C_{18} acids) or fish oils (rich in tetraene, pentaene and hexaene acids of C_{20} to C_{22} chain length) will produce effects as great as, or greater than, the oils so far tested has not been investigated under our experimental conditions. For the present it is profitable to analyse the response obtained in terms of the three major constituents of the fats used, namely, the total saturated fatty acids, the monoethenoid acid, and the diethenoid acids. All the fats discussed in this report were composed of only these three components, if for the moment the non-saponifiable material in these fats is disregarded. Therefore, it is possible to compare their composition graphically in a triangular diagram. Fig. 11 presents the data of table II in this form. This manner of representation has proved exceedingly useful to us in planning critical experiments. Thus, to define the effect of iodine number while holding linoleic-acid content fixed, the investigator selects fats which lie on the same linoleic-acid line (e.g., olive oil and palm oil), but which vary maximally in iodine number (92 and 57, respectively) because of reciprocal variations in saturated and oleic acids. Experiments designed to weigh the relative effects of the three postulated variables will be reported later.

It has been of interest to us that all reported analyses of natural fats made up only of these three groups of acids spread across the triangle in an arc from linoleic toward oleic and then upward to the saturated corner. Thus, a large portion of the triangle is unoccupied, representing an absence in Nature of fats rich in linoleic and saturated acids but poor in oleic acid. The oleomargarines produced in the 1930s before the development of partial-hydrogenation procedures were blended mixtures of unhydrogenated with completely hydrogenated oils. Such blended fats would lie in the portion of the triangle not occupied by any of the natural fats. Materials of this type, which may become of interest once again as margarines and shortenings, are currently being evaluated in our programme.

Over each locus on the triangular plot a vertical bar can be erected, the height of which is proportional to the degree of response of a serum-lipid to ingestion of that particular fat. In fig. 12, serum-cholesterol responses are related to the compositions of the various fats and oils shown in fig. 11. The shortest bars depict the lowest cholesterol levels, the longest bars the highest levels. Each bar denotes a single feeding-test. The average heights of the bars at each locus suggest a second surface with a contour which sweeps from the lower left corner upward to the right and then still higher to the upper corner. It will be of interest to define the shape of this contour more exactly.

Our present line of investigation has aimed at defining the specific dietary factors which cause the rises and falls in serum-lipid levels demonstrated above. An understanding of the mechanisms involved in these changes clearly demands a thorough preliminary exploration of food factors. If it is finally established that the phenomena under study are in fact due to the nature of the fed

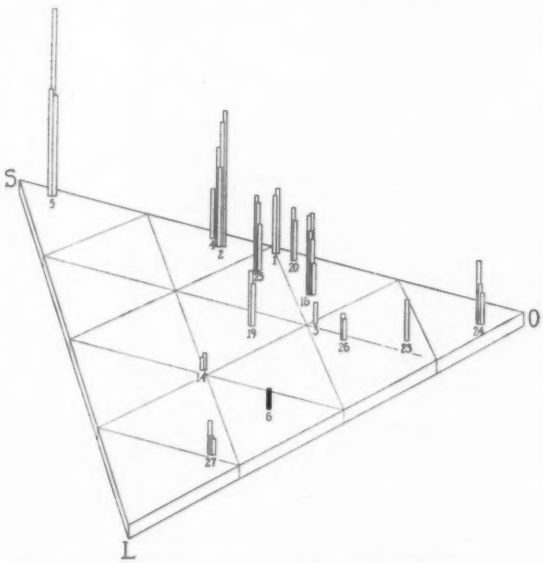

Fig. 12—Perspective view of triangular plot (fig. 11).

Columns raised at the location in the triangle of each fat are proportional in height to serum-cholesterol responses, expressed as percentage differences from corn-oil base-lines. Each column represents an individual feeding experiment. A second contour surface is suggested.

fatty acids and not to trace components in the oils so far tested, it may be profitable at this point to enumerate some of the questions which will require answers. If unsaturated acids cause lower lipid levels, is this due simply to the number of double bonds per unit weight of methylene groups, as our data suggest at present, or is the effect caused by certain unsaturated fatty acids and not by others? Do the monoenes have half the potency of the dienes? Are trienes more effective than dienes? Are conjugated double bonds as effective as non-conjugated? Do saturated acids, per se, cause higher serum-lipid levels, and if so, do all chain lengths have the same effect? What is the effect of ingestion of the fatty acid isomers produced by hydrogenation processes?

Assuming that the net effect of ingestion of a mixture of various fatty acids can be defined at one caloric level, what changes will be produced when the proportions of fat, carbohydrate, and protein are varied? It was stressed that this manipulation of dietary intakes had its major effect on the serum triglycerides, other serum-lipids varying in parallel but to a smaller degree. There have been many proponents of the low-fat diet, but few have measured the triglyceride response to this metabolic mixture. Hatch et al. (1955) studied the serum-lipid spectrum in forty-four patients subjected to a strict rice diet. They noted that in one-fifth of these patients visible lipæmia developed with a marked rise in triglycerides; in addition, ultracentrifugal patterns of the lipoproteins showed rising concentrations of $S_f 20$–100 species in all eleven patients so tested. Comparable trends were observed in our four patients who were given varying ratios of carbohydrate and fat calories. In the one patient so tested there was a dramatic rise in alpha$_2$-lipoproteins and in $S_f > 20$ species on low-fat regimens, and a reversion to normal on the 70% fat intake. We recognise that high levels of cholesterol and phospholipids on ad-libitum diets may be reduced on a low-fat regimen, at least temporarily, but in our experience a high intake of unsaturated fat leads to even more striking decreases in these serum components and in addition avoids increases in triglycerides.

Our readiness to accept the unsaturation hypothesis as firmly proven has been tempered by the realisation that none of the experiments performed here or elsewhere has ruled out the possibility that the factors sought may lie in the non-glyceride portion of the fed fats. In fact, in a recent abstract Beveridge et al. (1957a) concluded that the "plasma cholesterol depressant effect of corn oil depends to a large extent upon its sterol content." Our tests with molecularly distilled corn oils and with reconstituted corn-oil glycerides containing small amounts of non-saponifiable material suggest that, if a trace factor is involved, it must be active in extremely low concentration. By chemical processes on a pilot-plant scale it was possible to reduce sixfold the content of non-saponifiable material in corn oil. The same order of magnitude of change in intake of non-saponifiable material was also achieved by reducing the intake of whole corn oil from 70% to 10% of calories. In the latter experiment (fig. 10) the depressing effect of corn oil on serum-lipid was lost, yet after a sixfold decrease in non-saponifiable material by chemical treatment, the depressing effect was not lost (fig. 6). Clearly, the resolution of this issue awaits completion of feeding tests with glycerides synthesised from pure fatty acids. The great cost of producing sufficient amounts of pure acids has delayed the accomplishment of these critical experiments.

It is often asked whether patients are clinically improved when their serum-lipids are held continuously at a lower level by the regimens discussed in this report. On the whole, our patients have shown considerable subjective improvement while under our care. But we believe that this is primarily due to daily medical attention, to prolonged restriction of physical activity under pleasant hospital circumstances, and to our continual efforts to educate them about their disease. Patients who have gained the most reassurance have unquestionably benefited the most. Because so many non-specific factors have profoundly affected our patients' clinical status, it is impossible at this time to attribute to our dietary management any specific therapeutic merit. In fact, we consider hazardous any short-term evaluation of a therapeutic regimen in patients with coronary-artery disease. Until it becomes possible to assess the progress of the atheromatous process during life, it will be exceedingly difficult to determine whether a therapeutic measure is effective. It has been gratifying to observe the disappearance of skin xanthomata in patients with hyperlipæmia or hypercholesteræmia, but we have seen no changes in tendon xanthomata despite marked decreases in serum-cholesterol levels for as long as 2 years. It is an open question whether atheromata respond to this regimen as do skin xanthomata, or fail to be appreciably influenced like tendon xanthomata.

It is our present conclusion that recommendations for radical changes in food habits, even by those populations most seriously threatened by atherosclerosis, should await a clearer definition of the specific food factors which control serum-lipid levels. It is entirely possible that an understanding of the mechanisms evoked by these factors will lead to practical measures for control of serum-lipid concentrations. Only then can large-scale epidemiological experiments be planned to determine whether the incidence of atherosclerosis and its complications in the human species will be affected by decreasing the levels of lipids in the serum.

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NEONATAL DEATH AND ELECTIVE CÆSAREAN SECTION

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THE death of a newborn infant after cæsarean section is particularly disturbing because the operation is usually performed to save the infant's life. The decision to use this method of delivery has been made more difficult in recent years by the recurring suggestion that cæsarean section itself carries special and serious hazards for the infant.

Potter (1943) and Potter and Rosenbaum (1943) described a fatal syndrome preceded by mounting respiratory distress which was regarded as due to cæsarean section. This has been called the "cæsarean-section syndrome" and has been regarded as a direct effect of the operation (Bloxsom 1942, Williams 1950, Simpson and Geppert 1951, Smith 1953).

Our attention was first drawn to this question in 1951, when, by agreement with our obstetric colleagues, pædiatric care in this hospital was extended to include resuscitation of the newborn. This required attendance of a pædiatrician at every abnormal delivery, including cæsarean section. We were anxious to establish whether the operation carried a special risk for the baby, and, if it did, to discover whether any modifications in our method of resuscitation were necessary.

At first sight the published figures for neonatal deaths after cæsarean section supported the view that it carried a high risk for the baby.

Marshall and Cox (1949) reported a neonatal death-rate of 5·2% in a study combining the results of many centres. It was clear, however, that their material included many serious obstetric emergencies which exposed the baby to risks quite apart from those of cæsarean section.

Similarly, reports describing the "cæsarean section syndrome" included examples in which placenta prævia and rupture of the uterus were indications for the section (Potter and Rosenbaum 1943, Williams 1950).

Scope of Inquiry

As we considered these reports, it seemed clear that an assessment of the effect of cæsarean section on the baby could be made only in cases free from complications which were injurious in themselves. The maternal and neonatal case-records of all cæsarean sections performed in this hospital in 1946–50 were therefore examined, but consideration was confined to those in which the reason for the cæsarean section was disproportion or uncomplicated pre-eclampsia before the onset of labour.

In this study (Strang 1953) all the deaths except one could be adequately explained on the grounds of malformation, prematurity, or hæmolytic disease. The exception, that of a mature baby, was due to a sudden massive pulmonary hæmorrhage on the fourth post-operative day. As this was the only unexplained death, we concluded that we had no convincing evidence that cæsarean section harmed the mature baby.

The numbers of premature babies available for study were too small to measure the effects in their case. We were encouraged to continue our observations, however, by the report of Hamilton et al. (1949), which suggested that cæsarean section is more favourable than surgical induction and vaginal delivery for the small premature babies of toxæmic mothers.

In the following five years (1951–55) we continued our study of babies delivered by cæsarean section. During this time several reports have appeared which include data supporting the view that elective cæsarean section does not carry a special risk for the baby.

Landsman (1951), after allowing for congenital malformations, had a neonatal mortality of 0·4% in 534 cæsarean sections for disproportion, and he concluded that the high overall mortality of cæsarean section was related to the indication rather than to the operation, and that cæsarean section for disproportion is no greater risk to the infant than spontaneous vertex delivery.

Williams and Hollenbeck (1952) reported, in 148 repeat cæsarean sections, 5 neonatal deaths, of which 2 were due to hæmolytic disease of the newborn and 1 to congenital malformation.

Carey (1955) had only 2 deaths in 679 "elective" cæsarean sections which could not be explained on grounds of blood disorder, congenital malformation, or prematurity.

In 321 "elective" cæsarean sections Posner et al. (1954) reported only 2 deaths, 1 from congenital heart-disease and 1 from pneumonia.

A division of opinion on this question persists. Thus Montgomery et al. (1956), introducing important work on the blood oxygen saturation after vaginal and cæsarean delivery, said: "It is a generally accepted observation in obstetric and pædiatric circles that babies born by Caesarean Section do not do as well as those born by vaginal delivery." Because of this divided opinion we have decided to review our experience and to present our findings for the whole ten years 1946–55. We have done this from our initial premises: (1) that an assessment of the effects of cæsarean section on the baby is possible only in absence of other obvious risks; and (2) that mature and premature babies require separate consideration. During the second five years we made personal observations on the immediate newborn period, noting particularly the time taken to establish regular respiration.

Methods

The maternal and neonatal records for all cæsarean sections in the Princess Mary Maternity Hospital for 1946–55 were examined. Stillbirths were excluded because the issue concerned the influence of cæsarean section on the baby after delivery. The remaining records were divided into "elective" and "not elective":

Elective.—Cases in which a decision was made during the antenatal period to perform a cæsarean section and in which it was carried out before or within a few hours of the onset of labour. These included cases of disproportion from any cause and some cases of pre-eclampsia terminated by cæsarean section.

Not elective.—All other cæsarean sections, including emergencies of all kinds and cæsarean section terminating trial of labour. Included also were cases of hæmolytic disease of the newborn and maternal complications such as diabetes mellitus, heart-disease, ante-partum hæmorrhage, and eclampsia.

Pre-eclampsia was included in the elective group on the basis of Drillien's (1947) finding that, in comparable weight-groups, the infants of toxæmic mothers have survival-rates as good as those of infants of mothers without toxæmia. In 27 of 36 premature cæsarean sections the indication was the termination of severe pre-eclampsia. In some mature cases a mild pre-eclampsia coexisted but was not itself the indication for cæsarean section.

The fate of the babies in these two groups was determined by examining their neonatal records, and a note was made of any respiratory illness in the survivors and of any resuscitation required. In the deaths, the necropsy records, and where possible the histological sections, were examined.

Results

Mortality

Table I sets out the mortality after elective cæsarean section as defined above. The corrected mortality after removal of deaths due to congenital malformation is also shown. Of 251 mature babies 5 died. The details of these are :

TABLE I—NEONATAL MORTALITY IN ELECTIVE CÆSAREAN SECTION

—	Total	Deaths	" Corrected " deaths
Mature	251	5 (1·1%)	2 (0·8%)
Premature ..	36	9 (25%)	7 (19%)

Case 1.—Birth-weight 6 lb. 2 oz. Infant became cyanosed at twenty-four hours and died at forty-two hours. Necropsy revealed dilated bladder with congenital atresia of urethra. Lungs showed pulmonary hyaline membranes. [1946 : B.2162]

Case 2.—Birth-weight 5 lb. 11 oz. Intestinal obstruction ; operation at seventy-eight hours. Obstruction due to extensive adhesions could not be relieved. [1947 : B.1283]

Case 3.—Birth-weight 6 lb. 2 oz. This infant was observed with particular care and was quite normal until eighty-five hours. She then suddenly became cyanosed, with lung crepitations and a gush of blood from the mouth, and died at sixty-three hours. Necropsy revealed massive pulmonary hæmorrhage and pulmonary hyaline membranes. [1948 : B.1482]

Case 4.—Birth-weight 6 lb. 8 oz. Died at forty minutes. Necropsy revealed congenital laryngeal stenosis admitting only a fine probe. [1947 : B.1712]

Case 5.—Birth-weight 5 lb. 15 oz. Apparently normal until fifty-five hours, when baby became suddenly ill, with gush of blood from mouth, and died at sixty-three hours. Necropsy revealed massive pulmonary hæmorrhage ; no hyaline membranes. [1953 : B.450]

The 3 deaths due to congenital malformations cannot be put down to cæsarean section. The 2 deaths in mature babies with massive pulmonary hæmorrhage are a strange and unexplained finding, but we have no good reason for attributing them to cæsarean section. They are quite different from the " cæsarean-section syndrome " which has been described. Nevertheless we cannot deny that cæsarean section might have played a part in these deaths. If massive pulmonary hæmorrhage is to be regarded as a possible complication of elective cæsarean section it has an incidence of 0·8% in this material.

Premature Babies

The results for premature babies (table I) are more difficult to assess. The numbers are too small to permit a statistical comparison with normal vaginal deliveries in comparable weight-groups. It can be shown, however, that the mortality after " elective " cæsarean section is of the same order as for the whole group of premature babies. The results for all premature deliveries in this hospital for 1946–55 are given by weight-groups in table II, and in table III the results for cæsarean sections are compared with " expected " figures for these numbers on the basis of the figures in table II. The total mortalities compared in this way appear to be similar.

Necropsy was performed in 8 out of 9 premature deaths, and the causes of death were : severe congenital malformations, 2, massive pulmonary hæmorrhage 2, pulmonary hyaline membranes 3, and cerebral œdema only 1. In these deaths there was no unusual preponderance of pulmonary hyaline membranes, which Smith (1953) has regarded as the basis of the " cæsarean-section syndrome."

TABLE II—MORTALITY OF PREMATURE BABIES AFTER ALL FORMS OF DELIVERY (1946–55)

Birth-weight	Total	Deaths
<2 lb. 9 oz.	98	91 (93%)
2 lb. 9 oz.–3 lb. 8 oz.	224	104 (46%)
3 lb. 9 oz.–4 lb. 8 oz.	485	68 (14%)
4 lb. 9 oz.–5 lb. 8 oz.	1236	79 (6%)
Total	2043	342 (17%)

Morbidity in Surviving Babies Delivered by Cæsarean Section

During the ten-year period records were kept of every type of illness in all babies, and for 1951–55 records were also available of the time taken to establish regular respiration. 1 mature and 2 premature babies developed an episode of respiratory distress requiring oxygen and lasting twelve to twenty-four hours. All recovered completely. 1 mature baby developed a mild irritability requiring sedation but also recovered satisfactorily. There was no other illness in survivors. In 113 babies the time taken to establish regular respiration (one to thirteen minutes : mean, five minutes) was longer than after vaginal delivery. This delay was probably due to the maternal anæsthetic, and no harm was noted.

Resuscitation of Newborn after Cæsarean Section

Some workers who have accepted the idea of a " cæsarean-section syndrome " have advanced explanations and advocated preventive measures based on these theories.

TABLE III—MORTALITY OF PREMATURE BABIES AFTER ELECTIVE CÆSAREAN SECTION COMPARED WITH " EXPECTED " MORTALITY

Birth-weight	Total	Deaths	" Expected " deaths
<2 lb. 9 oz.	2	2	2
2 lb. 9 oz.–3 lb. 8 oz. ..	7	4	3
3 lb. 9 oz.–4 lb. 8 oz. ..	12	1	2
4 lb. 9 oz.–5 lb. 8 oz. ..	15	2	1
Total	36	9	8

Potter and Rosenbaum (1943) associated the syndrome with the necropsy finding of excess cerebrospinal fluid in the subarachnoid space, and Bloxsom (1942, 1953) recommended that labour should be allowed to start and progress for a few hours before any cæsarean section, in order to subject the fœtal head to compression. Landau et al. (1950) have suggested that the cæsarean baby is deprived of a normal transfusion from the placenta during labour, and that the " cæsarean-section syndrome " is due to partial exsanguination and consequent shock. These workers recommend that after delivery the placenta, still attached to the baby, should be suspended until all its blood has drained into the baby's circulation. Smith (1953) equates the " cæsarean-section syndrome " with pulmonary hyaline membranes and regards the increased liability to this as due to the inhalation of liquor, which has been shown to be present in excess in the stomachs of cæsarean babies (Gellis et al. 1949).

Though we cannot accept the idea of a " cæsarean-section syndrome," we believe that the cæsarean baby requires special care after delivery. The baby is usually anæsthetised, and may be unable to cough clear any obstructing mucus, and large volumes of liquor may drain from its stomach. Recent studies suggest that the full oxygenation of the blood may be delayed (Montgomery et al. 1956) and that the blood-pressure may be lower initially than after vaginal delivery (Holland and Young 1956).

Our practice is as follows. The obstetrician allows the cord to empty before it is divided. The baby is then handed to the pædiatrician, who normally performs a rapid laryngoscopy and removes by suction any obstructing mucus and then places the baby head-down in oxygen, the liquor being allowed to drain from the mouth. If the onset of respiration is delayed beyond

five minutes, the stomach is emptied by suction, and intragastric oxygen is given.

In 1951–55 records of resuscitation were available for 91 mature and 22 premature babies delivered by elective cæsarean section. Thick mucus requiring aspiration was found in 7 mature and 1 premature infants. Intragastric oxygen was given to 1 mature and 2 premature infants. As stated above, there was 1 unexplained death in mature babies in the five years before our resuscitation routine was started, and 1 similar death since it has been practised. It is evident that we cannot expect to see any obvious benefits from these measures in terms of reduced mortality, but it is also clear that it would be unwise to omit them.

Discussion

Because cæsarean section is so often the method of delivery when a serious obstetric complication is present, more babies die after it than after normal delivery. The allegation that the operation introduces a further substantial hazard has not in our view been proved. We believe that a misconception has arisen because attention has been focused on the whole group of cæsarean section, whereas a true assessment of the effects of the operation is possible only in cases free from all other risks.

Our results for mature babies leave little doubt that the risk for them in elective cæsarean delivery is small. In our material unexplained pulmonary hæmorrhage had an incidence of 0·8%, and we think it unlikely that the risk is higher than this. Similar unexpected death after perfectly normal vaginal delivery is by no means unknown in our experience. Because of our small numbers a definite statement on the delivery of premature babies by elective cæsarean section cannot be made, and it is arguable that larger numbers might demonstrate a definite hazard. However, the evidence of Hamilton et al. (1949) is against this.

The amount of respiratory illness observed in survivors was trifling—only 1 mature and 2 premature babies were involved. Although the onset of regular respiration was delayed, there is no evidence that this was harmful or due to anything other than the effects of the maternal anæsthetic. We believe, however, that the anæsthetised state of the baby is a sufficient reason for practising a simple routine of resuscitation designed to maintain a clear airway.

Although, in assessing the effect of the operation on the baby, we have regarded it as essential to consider only cæsarean sections free from complications, in these cases there is usually no alternative method of delivery. The choice of method usually has to be decided in situations complicated by adverse factors. If we accept that cæsarean section carries very little risk in the simple cases which we have termed "elective," we might reasonably argue that it does not add to the hazards of the complex cases in which a decision is really important. The choice often involves the delivery of a premature baby, and we therefore hope that it will be possible in future to build up a larger experience of the behaviour of premature babies after elective cæsarean section.

Summary

A "cæsarean-section syndrome" has previously been described in which the death of the infant with respiratory distress has been attributed to the operation.

The maternal and neonatal records were examined of 287 cases (251 mature infants and 36 premature) in which there was no complication of pregnancy or labour other than disproportion or pre-eclampsia.

In the 251 mature infants there were 5 neonatal deaths —3 from congenital malformations and 2 from massive pulmonary hæmorrhage.

The results for 36 premature infants were of the same order as for the whole group of premature babies in this hospital, and an unduly high incidence of hyaline membranes was not detected.

Only 3 of the surviving infants had an episode of respiratory distress.

It is suggested that, though the infant who has been delivered by cæsarean section will benefit from close attention in the immediate neonatal period, cæsarean section does not carry an appreciable extra risk for the baby.

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OUTPATIENT BRONCHODILATOR THERAPY

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THE importance of the chronic or recurrent wheezing which occurs in association with several pulmonary disorders lies in the fact that it is potentially reversible. Whereas wheezing can almost always be controlled when the patient is in hospital, its treatment in ambulant patients is considerably less satisfactory and considerably more difficult to assess. We have tried to assess the effects of five drugs, four of which are known to have a bronchodilator effect under controlled conditions, when each was given for a week in commonly used dosages under conditions approximating to those of ordinary outpatient practice. In a pilot trial no objective benefit was demonstrable with oral ephedrine (Hume and Gandevia 1957a).

Plan of Investigation

The four bronchodilator drugs tested, with their dosages, were as follows:

(1) 'Theodrox' one tablet three times daily, each tablet containing aminophylline gr. 3 and dried aluminium hydroxide gr. 4.

(2) Aminophylline suppositories one three times daily, each containing aminophylline gr. 4.

(3) Choline theophyllinate one tablet (200 mg.) three times a day.

(4) Isoprenaline one tablet (10 mg.) three times a day sublingually, increasing to two tablets three times a day or until side-effects became unpleasant.

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Aminophylline, choline theophyllinate, and isoprenaline have all been shown, by us and other investigators, to have an unequivocal bronchodilator action in short-term experiments. The theophylline content of aminophylline is 75–82% and of choline theophyllinate 64·4%.

For purposes of comparison phenobarbitone gr.$^1/_2$ twice daily, increasing to three times a day after five days, and a placebo composed of calcium carbonate and a trace of quinine sulphate one tablet three times a day were also included in the trial. In several patients we were unable to demonstrate a bronchodilator effect of phenobarbitone after a single dose of gr. 1. The dosages of all the drugs were the largest we were prepared to use in an experiment on volunteers, in whom it was desirable to keep side-effects to a minimum.

The design of the experiment took the form of latin squares, whereby all the drugs were in use throughout the trial, each patient taking a different drug each week. There were six groups of 3 patients, each group being allotted a different drug weekly according to a predetermined plan. A design of this type ensures that the overall comparisons between drugs are not affected by temporal differences in, for example, climatic conditions or by the order in which the drugs are taken. The default of several patients made formal statistical analysis of this design impracticable but did not detract greatly from its basic advantages. The data were finally analysed as a simple randomised block design.

18 patients were selected from among 40 volunteer patients attending the physiotherapy department of the Brompton Hospital. The remaining 22 patients were excluded because they did not show at least a 10% improvement in either vital capacity or in the volume of air expired in the first second of a forced expiration following the inhalation of a 1% isoprenaline aerosol. The plan of the experiment and the necessity for full coöperation over the whole six weeks were explained to all the patients individually. We have every reason to believe that they adhered faithfully to instructions, probably more so than any unselected series of outpatients.

At the time of the investigation, in the summer of 1956, all the selected patients had wheezing as a prominent symptom and rhonchi as a physical sign. All complained of cough with some sputum, which had been yellow at some time in all but 1 patient. The diagnoses recorded in the case-notes, made on clinical and radiological grounds, were as follows: asthma (2), chronic bronchitis (2), asthma and bronchitis or asthmatic bronchitis (6), bronchitis and emphysema (8). 6 of the patients were women. The ages ranged from 25 to 69, and 15 patients were aged more than 40. Their clinical status is reflected in the proportion of the *forced vital capacity* (F.V.C.) which is expelled in the first second; this is called the *forced expiratory volume* at one second ($F.E.V._{\cdot1\cdot0}$). The word forced indicates that the vital capacity breath is expelled as rapidly as possible. Normally the F.E.V. is 75–85% of the F.V.C.; in our series of patients this proportion averaged 51% (37–68%).

All but 3 of the patients completed the trial. These 3 may be regarded as not having entered it, for they had to be withdrawn within the first few days for reasons unrelated to the experiment. Of the remaining 15 patients 2 stayed away on one occasion each:

1 woman was confined to bed by a severe exacerbation of her asthma (the only patient to suffer this in the six weeks of the trial) while taking isoprenaline tablets (this compound was subsequently found to have given no definite benefit in the remaining patients); and 1 man, taking choline theophyllinate, missed the final assessment because of a miscalculation of his holiday dates. Both these patients' opinions (see below) of the two drugs they were taking at these times are available.

With the coöperation of the physicians and general practitioners concerned all other regular bronchodilator therapy was discontinued, the proviso being made that an exacerbation was to be treated as the general practitioner thought fit. The patients were allowed to continue with any sprays or tablets which they were taking only intermittently "when necessary," but each week they were asked to take into consideration the amounts which they had required when making their assessments of the value of the current trial drug.

The male and female patients were separately allocated at random into the required six groups, one for each drug. At each weekly visit each group obtained a supply of the drug to be taken for the following week. Until after the results had been collated and a preliminary analysis completed, the drugs were known to us only by their allotted code names.

Progress was assessed weekly in two complementary ways:

(1) The patient's opinion of each drug, based on his own assessment of his clinical condition over the appropriate week, was obtained by means of a questionnaire filled in at each visit. Several preliminary questions relating to the dosage of the trial drug taken, the time of the last dose, side-effects, and the amount of other intermittent medication taken ensured that the patient gave careful thought to his condition before expressing his opinions. He was then required to select the most appropriate of four statements, corresponding to "worse," ‡ "the same," "slightly better," and "much better," relative to his usual state, for which a point score of −1, 0, 1, and 2 was made accordingly.

(2) The second method of assessment was objective—the measurement of the volume of air expired in the first second of a forced maximal expiration after a full inspiration ($F.E.V._{\cdot1\cdot0}$). This test is quicker and less distressing than the maximal breathing capacity test. The two are comparable in their sensitivity to the influence of a bronchodilator drug, both being more sensitive than the forced vital capacity (Hume and Gandevia 1957a). It is also more sensitive than the two-second volume (unpublished data, confirmed for the present series of patients by analysis of the effects of inhaled isoprenaline), and it is generally regarded as a more repeatable measure than the forced vital capacity. The $F.E.V._{\cdot1\cdot0}$ was measured on a spirogram obtained from a spirometer of the type described by Bernstein et al. (1952), a peripheral drum speed of 16 mm. per second being used. The highest value derived from three satisfactory tracings was used; no correction for either temperature or pressure was applied. The tests were made with the patient seated and were supervised throughout by the same observer. The patients attended at the same time on the same afternoon of each week, the tests being made at the same time (between one and three hours) after the last dose of the drug under trial. A learning effect in the performance of the tests was not apparent, but the results of tests made in the preliminary examination and on the day of issue of the first series of drugs provided useful practice.

Each week half of the patients, always including the patients currently receiving the placebo, inhaled a mist of 1% isoprenaline administered with a Bright inhaler for one and a half minutes, after which the $F.E.V._{\cdot1\cdot0}$ was again measured. The chief purpose of this procedure was to provide a familiar standard—i.e., response to a commonly used aerosol—for comparison with the results obtained for the several trial compounds.

Results

We believe that the patients carried out the prescribed régime for each drug very well. No serious side-effects were observed. Only 1 patient (taking isoprenaline tablets) had a disabling exacerbation of asthma during the trial. The data for the objective assessment ($F.E.V._{\cdot1\cdot0}$), which it is convenient to consider first, were

‡ The statement "This treatment has not suited me at all" was used in preference to "This treatment has made me worse" to avoid the implication that bronchoconstricting agents had been deliberately included. Patients who were worse knew that this was the appropriate statement to mark as their opinion.

TABLE I—F.E.V.$_{1\cdot0}$ AT END OF TREATMENT WITH PLACEBO AND EACH DRUG AND PERCENTAGE CHANGE

Drug	Mean F.E.V.$_{1\cdot0}$ of 13 patients (c.cm.)	Mean percentage change on individual placebo values (standard deviation)
Placebo	1170	..
Aminophylline suppositories	1350	+20·4 (35·8)
Choline theophyllinate	1310	+15·0 (15·7)
Theodrox	1220	+ 7·1 (8·8)
Sublingual isoprenaline	1210	+ 7·5 (26·7)
Phenobarbitone	1200	+ 4·5 (14·9)
Placebo plus isoprenaline aerosol	1480	+27·8 (13·1)

The results for the placebo plus isoprenaline aerosol are shown for comparison.

analysed only for the 13 patients who were regularly assessed.

The mean weekly F.E.V.$_{1\cdot0}$ of the 13 patients was the same throughout the experimental period, ranging only from 1210 to 1290 c.cm. This gratifying lack of variability with time in the series as a whole adds significance to the analysis in terms of the influence of the drugs.

The mean F.E.V.$_{1\cdot0}$ after a week's treatment with the placebo and each of the drugs is set out in table I, together with the percentage change calculated from the values obtained for the placebo in each patient. The percentage increase produced by administration of isoprenaline aerosol, in addition to the placebo, is also shown. The table affords an easily appreciated comparison of the drugs, but detailed statistical examination was done after logarithmic transformation of the data to reduce the range of variation between patients or, more strictly,

TABLE II—RESULTS OF ANALYSIS OF VARIANCE ON LOG. F.E.V.$_{1\cdot0}$ VALUES FOR 13 PATIENTS TREATED WITH PLACEBO AND FIVE DRUGS

Source of variation	Sum of squares	Degrees of freedom	Mean squares	F. ratio	Significance level
Patients	1·4463	12	0·1205	35·7	Highly significant
Placebo *v.* drugs	0·0133	1	0·0133	3·93	$P = {}^{1}/_{20}$
Between drugs	0·0267	4	0·0067	2·00	$P = {}^{1}/_{10}$
Residual	0·2029	60	0·00338	..	..
Total	1·6892	77	..	..	..

to validate certain assumptions implicit in making an analysis of variance.

The results of an analysis of variance (table II) indicate that, though the patients were the major source of variation, the drugs (the four bronchodilator drugs plus phenobarbitone) exerted a significant influence on F.E.V.$_{1\cdot0}$ values; furthermore there is evidence that some drugs exerted a greater effect than others. This method of analysis ignores the order in which the drugs were taken and the question of whether the influence of a given drug is in some way manifest for a week or more after it has been stopped. We have assumed that these factors are unimportant.

Table III shows the percentage changes in F.E.V.$_{1\cdot0}$ values for each drug in relation to the placebo values computed from the analysis of variance. The upper and lower limits are shown between which the probability is 0·95 that the true percentage change lies. The appearance of the geometric rather than the arithmetic mean is the result of logarithmic transformation of the data. The procedure is an approximation, since same bias is involved in reverting from logarithmic values. It may be concluded that, though the drugs in general seemed to have a slight favourable effect on the F.E.V.$_{1\cdot0}$ under the conditions of the experiment, only aminophylline suppositories and choline theophyllinate showed a demonstrable individual effect.

In fig. 1 the individual values for F.E.V.$_{1\cdot0}$ are shown for all the patients, the results being expressed as percentages of the values obtained after treatment with the placebo. The influence of aminophylline suppositories and of choline theophyllinate is apparent. The changes with sublingual isoprenaline are inconsistent, but a small and relatively consistent effect of theodrox is suggested. The confidence limits cited in table III are based on the overall variation. Since the variation is much less in the results for patients taking theodrox, it is likely that the confidence limits for this drug are somewhat narrower than those shown.

The scores for each drug, based upon the patients' opinions, are set out in table IV. Preliminary analysis showed no evidence that the scores were influenced by the order in which the drugs were taken. The results indicate that the patients "identified" the placebo, and that their opinions were probably favourably influenced

TABLE III—PERCENTAGE INCREASE ON PLACEBO VALUES ABOUT GEOMETRIC MEAN *

Drug	Mean	95 % confidence limits	
		Upper	Lower
Aminophylline suppositories	+16	+29	+5
Choline theophyllinate	+13	+25	+2
Theodrox	+ 5	+16	−6
Sublingual isoprenaline	+ 5	+17	−5
Phenobarbitone	+ 3	+15	−7

* The use of the geometric mean is due to the logarithmic transformation.

by all the drugs except isoprenaline. The outstanding finding is the patients' appreciation of phenobarbitone; this was the only drug which no patient considered "did not suit him" and on which no patient felt he had deteriorated.

The relationship between the patients' opinions for each drug and changes in the values of F.E.V.$_{1\cdot0}$ is shown in fig. 2 for the 13 patients for whom both sets of data were available. The chief finding is that patients who felt greatly improved by any drug showed a mean increase of 32% in F.E.V.$_{1\cdot0}$. The patients tended to give lower

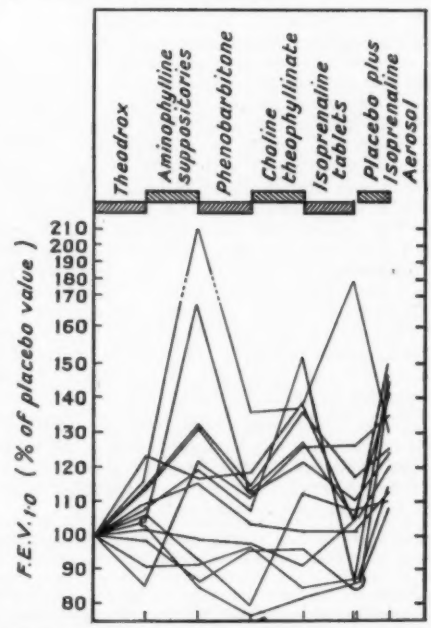

Fig. 1—Changes in F.E.V.$_{1\cdot0}$, expressed as percentage of placebo value, at end of one week's treatment with each trial drug and, at extreme right, after inhalation of 1% isoprenaline during treatment with placebo.

TABLE IV—PATIENTS' OPINIONS OF TRIAL DRUGS

Drug	Mean score	No. of patients having a score of			
		−1	0	+1	+2
Placebo	−0·07	4	8	3	0
Aminophylline suppositories	0·60	2	6	3	4
Choline theophyllinate	0·67	1	6	5	3
Theodrox	0·67	2	3	8	2
Sublingual isoprenaline	0·13	6	2	5	2
Phenobarbitone	0·73	0	6	7	2

The standard error of the difference between two means is 0·32, the calculation being based upon the residual mean square (0·786) of an analysis of variance.

scores for aminophylline suppositories than might have been anticipated from their improved F.E.V.$_{1\cdot0}$ values. Our impression, based on their verbal comments and questionnaire replies, is that this was related to their dislike of the method of administration. Possibly the scores for isoprenaline tablets were influenced by the palpitations which sometimes developed. However, in one or two instances, the reason for lack of correlation between the patient's opinion and change in F.E.V.$_{1\cdot0}$ was that the opinion was based on experience over a week, of which the F.E.V.$_{1\cdot0}$ was not representative.

Discussion

In view of the finding that the response to inhaled isoprenaline is a complex function of the initial F.E.V.$_{1\cdot0}$ (Hume and Gandevia 1957b) it is necessary to examine the validity of using changes in F.E.V.$_{1\cdot0}$ to compare the effects of different drugs at different times. The relationship existing is such that, as the pre-inhalation values for F.E.V.$_{1\cdot0}$ rise from the low levels associated with severe wheezing, so does the response to isoprenaline, both the initial level and the response being expressed in litres. There is a sharp peak of maximal response, after which the response tends to decrease progressively, the post-inhalation value for F.E.V.$_{1\cdot0}$ tending to remain constant. If a similar relationship exists for all bronchodilator drugs, irrespective of the route of administration, it may be unjust to compare the response to one drug on one day with the response to a second drug some time later. A spontaneous alteration in the initial level of the F.E.V.$_{1\cdot0}$ in the group of patients studied may conceivably place one drug at a distinct disadvantage.

In the present investigation it is likely that the latin-square design will have eliminated this factor as a cause of serious error. In any event the effect described would tend to blur the comparisons between drugs, yet we have been able to show significant differences between them.

The objective assessment provided by the F.E.V.$_{1\cdot0}$ indicates that, under conditions of outpatient practice, choline theophyllinate and aminophylline suppositories are reasonably effective bronchodilators, the improvement produced being rather less than the immediate response to an isoprenaline aerosol. The possibility that some patients respond to one drug but not to another remains likely, but the effect of this in a small series is to diminish the chances of showing that any drug is effective at all. In so far as significance can be attached to the results in a single person, fig. 1 shows that 1 patient responded to choline theophyllinate but not to aminophylline suppositories, and 1 did the reverse. Fig. 1 also suggests that the trial series included 4 or 5 patients relatively unresponsive to all the antispasmodics tried, despite the fact that a prerequisite for inclusion in the trial was an improvement of more than 10% in F.E.V.$_{1\cdot0}$ after an inhalation of 1% isoprenaline. 3 of these patients had been diagnosed as having emphysema, but the group showed no well-defined distinguishing features clinically. Previous therapy with the trial drugs may have produced some drug resistance.

The patients' approval of phenobarbitone is of interest not only from the therapeutic point of view but also because of the light it throws upon the significance of the patients' opinions about their well-being. We believe that the search for objective methods of assessment has led to the patients' views being too often neglected and regarded as valueless. Phenobarbitone was deliberately included in the trial in an attempt to obtain, as it were, an objective assessment of the meaning of these opinions. Our results suggest that phenobarbitone is a satisfying drug for these patients, who probably tend to be anxious and introspective, in spite of its lack of definite effect on ventilatory capacity. It follows that, in assessing their own progress, these patients are influenced by sensations other than those of wheezing and dyspnœa, even when they know that their ability to breathe is the subject of a special study. That their opinions are also related to changes in their ability to breathe is indicated by the high values found for F.E.V.$_{1\cdot0}$ when they were feeling

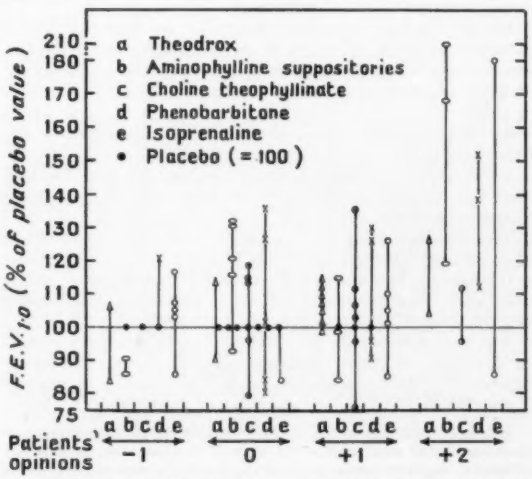

Fig. 2—Relationship between F.E.V.$_{1\cdot0}$, expressed as a percentage of placebo value, and patient's opinion of his progress expressed in grades (−1 to +2; see text).

" much better." From the present figures and from other observations it seems possible that an improvement of more than about 10% in F.E.V.$_{1\cdot0}$ over a week can be reflected in a patient's opinion, but only if the drug used has no undesirable properties; an increase of this order is certainly appreciated when it is produced over a few minutes with a suitable aerosol.

The influence of personality on a patient's opinion about his progress is well known.

Although we made no deliberate study of this factor, it was well illustrated by 1 patient, a most coöperative but uncommunicative, almost morose, man, who felt that four of the six treatments made no difference and two made him worse. One of the latter was associated with an increase of 20% in F.E.V.$_{1\cdot0}$, and two of the former with an increase of over 30%; on these occasions clinical improvement was obvious at a glance.

More or less systematic errors of opinion are not important in comparative trials of this type. More important are those who are bad observers, suggested by the variability of their opinions. The existence of this group determines the necessity for relatively large series to obtain significant results. The observer conducting the tests gained the impression in conversation that the knowledge that they were taking part in an experiment made the patients more frankly critical of the drugs than were patients attending a routine clinic. This is of no significance in the circumstances of the trial but may be relevant in relating our findings to clinical practice.

In summary it is clear, from the present study of 15 patients, that not only are the patients' opinions complementary to objective methods but also the patients are successful in distinguishing between treatments. The opinions of somewhat larger groups can achieve the more difficult feat of discriminating between two forms of breathing exercises, their distinction being supported by such objective assessments as were made (Bolton et al. 1956).

Conclusion

The conclusion reached from this investigation is that, excluding hormonal therapy and under conditions of outpatient practice, the most satisfactory symptomatic treatment of wheezing dyspnœa at present available is likely to be a combination of one of the more effective bronchodilators with small daily doses of phenobarbitone. The need for dual therapy in some form is emphasised when the effective drug is likely to be unpopular for any reason.

Summary

On a latin-square experimental design four commonly prescribed bronchodilators, phenobarbitone, and a placebo were given for a week each to 15 patients complaining of wheezing dyspnœa associated with asthma, bronchitis, or bronchitis and emphysema. The effects of these drugs were assessed in terms of the patients' opinions and the forced expiratory volume at one second.

The patients' opinions distinguished the placebo and were favourably influenced by phenobarbitone and three of the bronchodilators.

The changes in forced expiratory volume at one second showed that, though the drugs in general were producing a favourable response, only aminophylline suppositories and oral choline theophyllinate appeared reasonably reliable and effective in the dosages used.

The significance of the patients' opinions is discussed in the light of these findings, and the complementary nature of the subjective and objective assessments is emphasised.

We are indebted to Dr. J. G. Scadding and to members of the consultant staff of the Brompton Hospital for permission to study their patients, and to the patients and their general practitioners for their willing coöperation. Our thanks are also due to Dr. P. Armitage, in particular, for statistical advice and assistance, and to Mr. S. Powlson, chief pharmacist, for his help in distributing the drugs.

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PLANTS AS ÆTIOLOGICAL FACTOR IN VENO-OCCLUSIVE DISEASE OF THE LIVER

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A PARTICULAR form of infantile cirrhosis of the liver reported from Jamaica (McFarlane and Branday 1945, Hill 1951, Hill et al. 1953) differs in several respects from the mild hepatic injury seen in kwashiorkor. The morphological picture in this infantile cirrhosis is dominated by an obliterating lesion—veno-occlusive disease (Bras et al. 1954)—of the medium-sized and smaller ramifications of the hepatic veins with non-portal cirrhosis as the ultimate result. The essential pathology of veno-occlusive disease was described in this journal by Bras and Hill (1956).

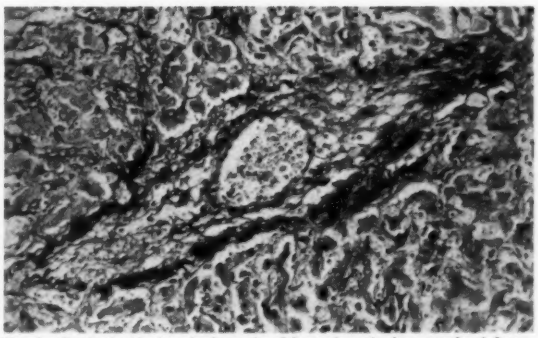

Fig. 1—Occlusive lesion in branch of hepatic vein in cow dead from veno-occlusive disease. (Mallory trichrome stain. ×107.)

The toxic origin of veno-occlusive disease was originally suspected by McFarlane and Branday (1945). The practice of making a decoction of the leaves of various plants and consuming the resultant liquids (bush-tea) is well established in Jamaica and neighbouring islands as a remedy for ailments and otherwise.

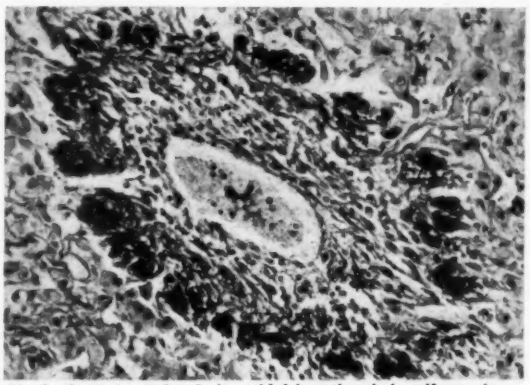

Fig. 2—Occlusive lesion in branch of hepatic vein in calf experimentally fed on *Crotalaria fulva*. (Mallory trichrome stain. ×124.)

The development, in a cow in Jamaica, of a lesion (fig. 1) morphologically similar to that of veno-occlusive disease (Bras and Berry 1956) tended to support the hypothesis that veno-occlusive disease was due to plant poison imbibed with bush-teas.

Since 1950 the assumption that bush-tea may play a prominent rôle in the development of infantile cirrhosis seen in Jamaica has been tested extensively in experiments on white rats under varying conditions.* More recently we have experimented on calves.†

It has been known for a considerable time (see Theiler 1920) that senecio (ragwort) is poisonous to horses and cattle and can produce a disease of the liver leading to fibrosis and cirrhosis. Willmot and Robertson (1920) and Selzer and Parker (1951) focused our attention on these

* These experiments were made in the laboratory of one of us (P. G.) as part of a collaborative study of the research groups at the University College of the West Indies and the University of Pennsylvania. These investigations, including those reported here, were supported by grants of the Nutrition Foundation and the Josiah Macy, jun., Foundation, New York.
† This part was done in Jamaica and made possible through facilities put at our disposal by Reynolds Jamaica Mines.

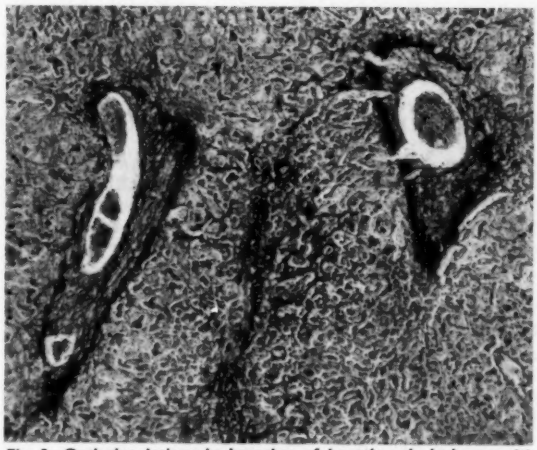

Fig. 3—Occlusive lesions in branches of hepatic vein in horse with clinical crotalaria poisoning. (Mallory trichrome stain. ×47.)

plants, especially since, in the case reported by Selzer and Parker, a pathological lesion was observed in the branches of the hepatic vein. Betty and Markson (1954) and Cockburn et al. (1955) have described poisoning with senecio in animals.

On the other hand, observations on veno-occlusive disease in man in Barbados implicated crotalaria (rattle-box) (Stuart and Bras 1956). In the veterinary literature crotalaria poisoning has been described since 1884 (Bessey and Stalker 1884) and has been associated with parenchymatous hepatitis in horses and cattle since 1920 (Theiler 1920). Reports of the toxicity of crotalaria and the incidence of poisoning by it in cattle (Becker et al. 1935, Sanders et al. 1936), swine (Emmel et al. 1935), chickens (Neal and Becker 1933, Thomas 1934), quail and doves (Thomas 1934), and horses and goats (Emmel and Sanders 1942) came from America and from South Africa, India, and Australia (L. B. Bull, personal communication). Further reports on the toxicity of these plants were given by Piercy and Rusoff (1946) and Gibbons et al. (1950). Intensive experimental studies with one of the hepatotoxic pyrrolizidine alkaloids, monocrotaline, present in crotalaria, were made by Ratnoff and Mirick (1948, 1949). Chemically monocrotaline is closely related to a similar pyrrolizidine alkaloid retrorsine, contained in senecio (Adams and Rogers 1939). We are not aware of previous reports of crotalaria poisoning in man.

Material

We report here our findings in a calf fed experimentally on *Crotalaria fulva* and our observations on material kindly sent to us by other investigators working on crotalaria and senecio poisoning. All the animals had obliterative lesions of the hepatic vein similar to those observed in veno-occlusive disease in man.

Crotalaria

In 5 calves experimentally fed on *Crotalaria fulva* serial liver biopsies were made at monthly intervals. 4 of these calves died without remarkable histopathological changes in their livers. The 5th calf developed, after six months, an obliterative hepatovenous lesion (fig. 2). 5 control calves remained free from change up till eight months after the beginning of the experiment, which was then terminated.

Dr. W. J. Gibbons kindly sent us material from horses with clinical crotalaria poisoning in which we observed lesions like that shown in fig. 3.

Dr. L. B. Bull's material from a horse dead from accidental crotalaria poisoning showed lesions like that depicted in fig. 4.

Senecio

Material kindly put at our disposal by Dr. L. M. Markson and obtained from cattle with accidental senecio poisoning displayed vascular lesions perfectly matching those of veno-occlusive disease in man (fig. 5). Fig. 6 shows a lesion in a horse fed experimentally on senecio by Dr. J. Vanek.

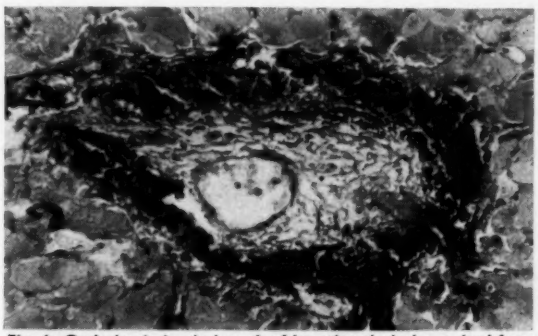

Fig. 4—Occlusive lesion in branch of hepatic vein in horse dead from accidental crotalaria poisoning. (Mallory trichrome stain. ×167.)

Senecio fed to rats and cattle has, in our hands, so far not produced vascular changes.

We believe that the evidence thus accumulated is relevant to the ætiology of veno-occlusive disease in Jamaica, because both senecio and crotalaria are regularly being consumed by the Jamaican population.

Discussion

Senecio and crotalaria, both in our hands and in the hands of others, have produced in rats, cattle, and horses

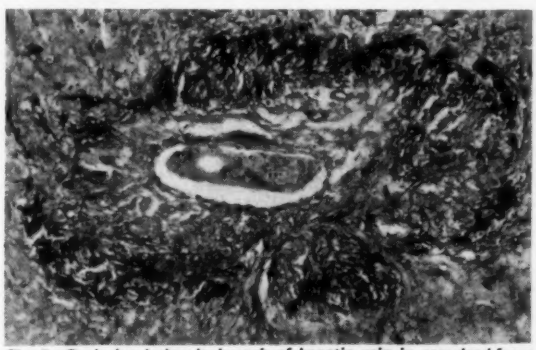

Fig. 5—Occlusive lesion in branch of hepatic vein in cow dead from accidental senecio poisoning. (Mallory trichrome stain. ×89.)

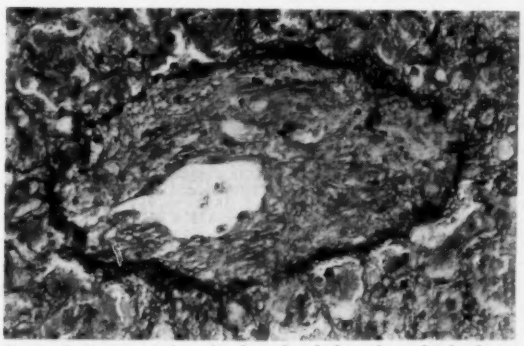

Fig. 6—Occlusive lesion in branch of hepatic vein in horse experimentally fed on *Senecio erraticus barbaræfolius*. (Mallory trichrome stain. ×173.)

much hepatocellular damage. The only convincing vascular lesions—i.e., obliterating lesions of the branches of the hepatic veins—that we have been able to find published were those pictured by Davidson (1935) after the administration of retrorsine to rats and by Vanek (1956). A comprehensive report by Bull et al. (1957) on crotalaria poisoning in horses in Northern Australia gives histopathological observations, including some hepatovenous changes. Blood lagoons, with intralobular hæmorrhage and massive central necrosis in the liver lobules, have been described in animals with crotalaria poisoning (Emmel et al. 1935, Harris et al. 1942, O. D. Ratnoff personal communication), but no vascular changes.

Senecio and crotalaria have pyrrolizidine alkaloids in common, and extensive work on this has been done in Australia (Bull et al. 1956) and elsewhere (see Schoental and Head 1955), the damage to the liver being reported as hepatocellular.

In our hands *Crotalaria fulva* has produced veno-occlusive disease (fig. 2), and in material sent to us by other investigators both senecio and crotalaria had produced obliterating lesions of the hepatic veins. The importance of the obliterating lesion and its rôle in the production of hepatocellular damage with subsequent fibrosis need further study.

In view of the seemingly independent and/or concurrent appearance of hepatocellular damage, on the one hand, and obliterating vascular lesions of the hepatic veins, on the other, we are exploring the possibility that more than one toxin may be responsible for this, each with a different target area. The different poisonous substances may well be unequal in concentration and in toxicity and may differ in various parts of the plants and at various times of the plant's life.

Summary

It is postulated, on the evidence of experiments with *Crotalaria fulva* on cattle in Jamaica, that herbal infusions made from crotalaria and taken by the Jamaican population for medicinal and other purposes constitute (one of) the ætiological factor(s) in veno-occlusive disease of the liver.

It appears that a similar rôle is played by senecio.

All plants were collected by the Department of Botany, University College of the West Indies, and we are extremely grateful to Prof. G. F. Asprey, Dr. J. H. Palmer, and Prof. A. D. Skelding for their coöperation.

We are greatly indebted to Dr. W. J. Gibbons, of the School of Veterinary Medicine, Auburn, Alabama, U.S.A.; Dr. L. B. Bull, of the Commonwealth Scientific and Industrial Research Organisation, Australia; Dr. L. M. Markson, of the Ministry of Agriculture, Fisheries and Food, Veterinary Laboratory, England; and Dr. J. Vanek of the Karlovy University, Prague, for supplying material.

We also thank the Josiah Macy, jun., Foundation, Reynolds Jamaica Mines, the Colonial Medical Research Committee, and the Government of Jamaica for providing facilities for this experimental work.

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L-NORADRENALINE THERAPY IN ACUTE RENAL FAILURE

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THE use of L-noradrenaline in the treatment of hypotensive states was inaugurated by Goldenberg et al. (1949) and its successful use has often been reported since. The physiological aspects of using noradrenaline as a vasopressor drug have been fully discussed by Von Euler (1955). He laid stress on the importance of starting treatment early, in view of the increasing refractoriness of the blood-vessels to the action of physiologically released or exogenously added noradrenaline during prolonged hypotension. 'Levophed,' a solution of L-noradrenaline bitartrate, contains 1 mg. of active base to each millilitre and is usually diluted with 5% dextrose and given by continuous intravenous infusion.

The term "peripheral circulatory failure" has come into use to describe the clinical picture of prolonged hypotension associated with a sluggish peripheral circulation and patchy cyanosis of the extremities. It may arise when no blood has been lost, or after apparently adequate restoration of blood-volume when this has been reduced by hæmorrhage or severe dehydration. Peripheral circulatory failure has been observed in patients with fulminating infections, intestinal strangulation, acute pancreatitis, coronary thrombosis, pulmonary embolism, chemical pneumonitis, diabetic ketosis, acute adrenal failure, and barbiturate poisoning, and after operations. When acute renal failure is already present, or develops as a result of prolonged hypotension, the effect of noradrenaline on the kidneys has to be considered.

Nickel et al. (1954) and others have shown that in normal people noradrenaline, in doses large enough to raise the systolic blood-pressure by 25–50 mm. Hg, produces a reduction in renal blood-flow with an increase in urine-flow and in tubular reabsorption of sodium and potassium. Nickel et al. suggested that at least some of these effects were due to intrarenal vasoconstriction and relative tubular ischæmia. Lathem (1956) demonstrated similar results in patients with chronic renal disease. These results might suggest that noradrenaline should not be used in hypotensive patients with severe oliguria or anuria, because of the danger of increasing already existing tubular damage. On the other hand, restoration of the systolic pressure to normal levels by noradrenaline will increase the renal blood-flow and may well outweigh the local vasoconstrictor effect on the renal vessels. In the two cases reported here treatment with noradrenaline led to satisfactory recovery.

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TABLE I—LABORATORY FINDINGS IN CASE 1

—	Normal range	Oliguric phase									Diuretic phase							
Postoperative day	..	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	19	22
Hb (%)	..	88	..	..	93	..	88	..	..	..	..	..	..	..	..	77	..	..
Blood-urea (mg. per 100 ml.)	20–40	162	214	194	276	260	288	324	304	320	292	212	204	136	102	69	65	35
Plasma-sodium (m.eq. per litre)	138–148	131	..	152	153	146	142	147	141	149	136	137	140	139	132	133	..	..
Plasma-potassium (m.eq. per litre) ..	3·5–5·5	5·4	..	3·2	3·6	4·4	4·8	5·6	4·9	4·8	4·2	4·2	5·4	4·9	5·3	4·7	..	..
Plasma-chloride (m.eq. per litre)	96–106	85	..	106	100	95	91	99	94	96	88	88	96	96	96	100	..	..
Plasma-bicarbonate (m.eq. per litre) ..	25–30	21·4	..	15·6	21·4	19·6	17·9	17·0	17·9	..	19·7	19·7	19·7	..	21·4	21·4	..	..

Methods

All blood samples were collected from a vein. The analytical methods were as follows: sodium and potassium, flame-photometer (Evans Electro-selenium Ltd.); chloride, method of Schales and Schales (King 1946); bicarbonate, titration method (Lehmann 1951); urea, urease-nesslerisation method (King 1946). All urine samples were collected by an indwelling Foley's self-retaining catheter during the period of oliguria.

Case-reports

FIRST CASE

A woman, aged 63, with no history of renal disease and in otherwise good health, had a vaginal hysterectomy on account of complete procidentia on Nov. 24, 1955. Her preoperative blood-pressure (B.P.) was 170/90 mm. Hg. There was some blood-loss at operation, but this was replaced by 2 pints of compatible whole blood at the time and her hæmoglobin next day was 92%.

1st postoperative day.—No urine was passed all day, and she started vomiting during the afternoon. Her daily fluid intake was restricted to 1 litre of distilled water containing 400 g. of dextrose by intragastric drip.

2nd day.—A further litre of the dextrose solution was given during the 24 hours. No fat was included in the drip because it increased the nausea and vomiting. Only 350 ml. of urine was collected by catheter. Blood was taken daily from now on for electrolyte and blood-urea estimations (table I). The patient was nursed in isolation and started on a single daily injection of a million units of crystalline penicillin. Parenteral ascorbic-acid and vitamin-B complex were also given.

3rd day.—During the night profuse watery diarrhœa developed. Her fluid intake was increased, but she continued to pass a lot of fluid per rectum and by the afternoon was in peripheral circulatory failure with an unrecordable B.P. She was now clinically dehydrated, but the rapid intravenous infusion of 2 litres of physiological saline solution and 2 pints of plasma had no effect on her B.P. Intravenous methylamphetamine hydrochloride ('Methedrine') 25 mg. was also without effect, and, as the patient was now moribund, noradrenaline (levophed) was added to the infusion fluid, producing a rapid rise in her systolic pressure to 130 mm. Hg. The blood-pressure was maintained about this level, by adjusting the drip and altering the amount of noradrenaline in the infusion bottles, for several days (fig. 1). Through another vein a further 2 pints of compatible whole blood was given. She was now anuric again with a blood-urea of 215 mg. per 100 ml.

4th day.—The intragastric drip was continued, but with a reduced dextrose content of only 100 g. per litre, for it was found that higher concentrations caused vomiting and diarrhœa. Fluid balance was difficult to estimate, for an unknown quantity of fluid—probably several litres—had been lost per rectum. Since this loss had now stopped, and she was no longer clinically dehydrated, the daily fluid intake was restricted to 1 litre by intragastric drip and intravenous infusion. In addition, water and later very weak tea were given by mouth equal in amount to her urinary output of the previous 24 hours (fig. 2). It was thought that the patient might be deficient in potassium because of the diarrhœa, and this was confirmed by a plasma level of 3·2 m.eq. per litre and also suggested by an electrocardiogram, the QT_c interval being prolonged to 0·48 sec. About 50 m.eq. of potassium, in a mixture of potassium salts, was added daily to the intragastric

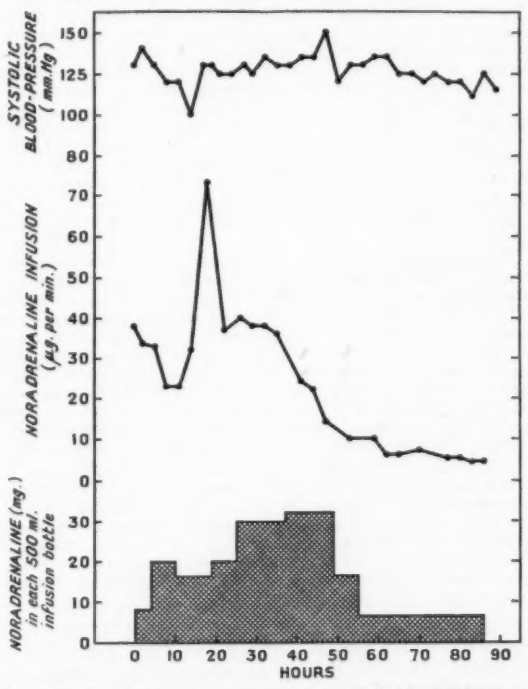

Fig. 1—Case 1: systolic blood-pressure, rates of infusion of noradrenaline, and amounts of noradrenaline in each 500-ml. infusion bottle.

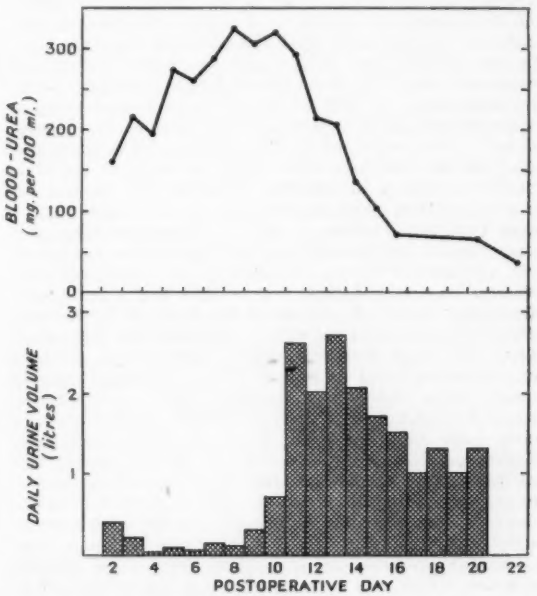

Fig. 2—Case 1: blood-urea levels and daily urine output (urine collections after the 14th day incomplete).

drip. Her general condition had improved, but her temperature had risen to 101°F and fæcal culture had produced a strong growth of *Staphylococcus aureus*. She was therefore given oral erythromycin 400 mg. 6-hourly, since it was suspected, and later confirmed, that this organism might be resistant to other antibiotics. Her fever settled in a few hours. The amount of noradrenaline required to maintain her B.P., which had risen to 73 μg. per min., now began to fall.

5th and 6th days.—Oliguria persisted and the urine contained many red and white blood-cells. A strong growth of *Staph. aureus* was obtained on culture, though by now fæcal swabs were sterile and the temperature normal. The blood-urea rose to 260 mg. per 100 ml., but the nausea and vomiting had ceased. The patient was very drowsy, sleeping most of the day. The plasma-potassium level was now within the normal range.

7th day.—The noradrenaline infusion was stopped when the infusion-rate had fallen to 4 μg. per min. It had run for 86 hours without complications or obvious side-effects, and through the same vein for over 80 hours.

8th to 22nd days.—The erythromycin was discontinued after a total dose of 5·6 g. Fluids were restricted until diuresis started on the 11th day; adequate amounts were then given to compensate for the increasing urinary losses. A low-protein, high-carbohydrate diet, with additional sodium and potassium, was then started and steadily increased to a normal ward diet by the 22nd day. No renal function tests were carried out, but proteinuria persisted for some weeks afterwards.

SECOND CASE

An obese man, aged 49, developed polyuria and polydypsia, and lost two stone in weight in 6 weeks. He was admitted in a drowsy, confused state with diabetic ketosis and a blood-sugar of 800 mg. per 100 ml. Despite massive doses of insulin and intravenous saline, he became oliguric and pulseless, his blood-urea rising to 160 mg. per 100 ml. A noradrenaline drip was started and the systolic pressure rose rapidly to 130 mm. Hg, where it was maintained by a concentration of about 20 μg. per min. His urine output increased and he recovered completely after receiving 3200 units of soluble insulin and 12 litres of intravenous fluids during the first 12 hours of treatment.

Discussion

The first patient did not become dehydrated until after the profuse diarrhœa on the 3rd postoperative day; this cannot have been the cause of the previous oliguria and raised blood-urea, though it may have contributed to the renal damage (Oliver et al. 1951). Treatment was based on restriction of fluid and electrolyte intake until diuresis started (Bull 1955); and, apart from giving oral potassium when the serum level fell to 3·2 m.eq. per litre, the temptation to try to adjust the serum-electrolyte levels towards normality was resisted during the oliguric phase. The minimum 1600 calories a day was not achieved because the patient could not tolerate the high concentrations of intragastric dextrose and peanut oil to provide this. For several days she did not receive more than 400 calories a day. A direct infusion of a concentrated dextrose solution into the inferior vena cava (via a femoral vein) was thought to be contra-indicated because of severe *Staph. aureus* infection. Peripheral circulatory failure developed at the onset of the fulminating staphylococcal enteritis. The enteritis responded slowly to oral erythromycin. Intravenous methylamphetamine failed to raise the B.P., as Downie (1954) found when treating a patient with postoperative peripheral circulatory failure. Similar negative results have been reported with dexamphetamine sulphate. Methylamphetamine raises the B.P. by increasing the cardiac output, at the same time lowering the peripheral resistance (Churchill-Davidson 1951); it would therefore not be expected to be effective in the treatment of peripheral circulatory failure. On the other hand, noradrenaline produced an immediate rise in the systolic pressure, which was maintained by a continuous intravenous infusion. Therapy was complicated by the need to restrict the total fluid intake to about a litre a day. The infusion ran for 86 hours without any complications or side-effects. Diuresis started after 10 days of severe oliguria (fig. 2).

In the second patient noradrenaline produced an immediate rise in B.P., followed by a considerable increase in the urine output. Noradrenaline produces a fall in renal blood-flow and an increased urinary output in normal people (Nickel et al. 1954), but it seems more likely that the increased urinary flow in this patient was primarily due to restoration of the B.P. to normal levels. Oliguria is not uncommon in hypotensive states, and a similar restoration of normal urinary flow was seen in two cases of barbiturate poisoning treated with noradrenaline (Mattingly 1955). It is impossible to prove that noradrenaline had no deleterious effect on these patients' kidneys, but it is equally certain that without it neither would have survived. The theoretical dangers and toxic effects of L-noradrenaline infusions have been surveyed by Ritchie (1956). In a small series of cases the only "toxic" effect observed was excessive sweating, which appeared only with high concentrations. Local tissue necrosis was avoided in the first case by inserting a 'Polythene' tube several inches up an ankle vein and tying it in; this vein was used continuously for over 80 hours; watch was kept for the bluish discoloration of the overlying skin which is the first sign of impending trouble. The second patient received an infusion through a needle in a superficial arm vein. After some hours bluish discoloration developed, with obvious leakage into the surrounding tissues. Fortunately it was possible to discontinue the noradrenaline at this point and there was no sloughing.

Dosage

Little guidance is given in the literature as to the dosage of noradrenaline required to restore the blood-pressure to normal levels in patients with peripheral circulatory failure.

The dosage depends on the amount of noradrenaline in the infused solution and on the drip-rate. Ritchie (1956) states that the correct dosage is that which raises the pressure to the desired level and maintains it there. There is, however, considerable difference of opinion as to what are desirable levels. It seems reasonable to suspect peripheral circulatory failure if the systolic pressure falls below 100 mm. Hg (Downie 1954), and to aim at raising it to about 130 mm. Hg. The amount of noradrenaline needed to achieve this varies widely from patient to patient. Nickel et al. (1954) used 12–15 μg. per min. in normal people to raise the systolic pressure by 25–50 mm. Hg, and Lathem (1956) found that similar amounts were necessary in patients with chronic renal disease. Much larger amounts—up to 72 μg. per min.—were required in some cases.

For hypotensive states Goldenberg et al. (1949) recommended not more than 0·36 μg. per kg. body-weight per min.; and Martindale (1952) suggests 6–8 μg. per min. administered in 1·5–2·0 ml. per min. In the present case 1, who required nearly 40 μg. per min. initially, such a dilution would have involved infusing 10 ml. per min., or 600 ml. an hour, and gross over-hydration would have resulted. De Swiet (1955) found it necessary to increase the dosage to 150 μg. per min. over two periods of 8 hours when treating a patient with pulmonary embolism. There is no evidence that such a high dosage is dangerous provided the blood-pressure is watched.

Von Euler (1955) reports a case of phæochromocytoma in which as much as 9000 μg. per 24 hours was excreted, probably corresponding to a release into the circulation of about 200 mg., or 140 μg. per min. In the average case of peripheral circulatory failure the initial dosage of noradrenaline required will range from 10 to 30 μg. per min., but larger amounts may be needed, particularly if treatment is delayed and the vessels become increasingly refractory.

The only real criterion of effective dosage is the fairly rapid rise of the systolic pressure, within a few minutes, to about 130 mm. Hg. If no response is obtained the concentration of noradrenaline in the infused solution should be doubled or trebled to avoid overhydration.

The management of these cases, once it has been decided to administer noradrenaline depends on two factors:

(1) The amount of intravenous fluid that can safely be given. Table II shows the relationship between drip-rate and daily fluid intake. Not more than 0·6 ml. per min. should be given if the patient is anuric. For simplicity 20 drops has been taken to equal 1·0 ml., which is approximately correct for most drip sets. A more accurate relationship can be established by dripping the infusion solution into the barrel of a 2 or 5 ml. syringe.

TABLE II—SUGGESTED RATE OF INFUSION, DEPENDING ON CLINICAL STATE OF PATIENT

Clinical state	Litres per 24 hr.	Ml. per min.	Drops per min.
Anuria; heart-failure	0·8	0·6	12
Hydrated; normal renal function ..	2·4	1·8	36

(2) The initial concentration of noradrenaline to restore the blood-pressure must be assessed beforehand. Table III provides a rough guide which has proved useful in practice.

TABLE III—SUGGESTED RATE OF ADMINISTRATION OF NORADRENALINE WHEN STARTING INFUSION

Clinical state	Systolic B.P. (mm. Hg)	Noradrenaline (μg. per min.)
Early circulatory failure	More than 60	10
Severe protracted hypotension ..	Less than 60	20
Pulseless	Unrecordable	30

Only when these two factors have been decided is it possible to calculate the amount of noradrenaline to add to the infusion bottles.

For example, an anuric, pulseless patient will probably need 30 μg. per minute in not more than 0·6 ml. of fluid. It will be necessary to add 24 mg. of noradrenaline to 500 ml. of 5% dextrose to achieve this dosage at this drip-rate.

To facilitate these calculations the noradrenaline dosage chart shown in fig. 3 was devised. The diagonal lines represent the amount of noradrenaline in mg. which must be added to 500 ml. of intravenous fluid at varying noradrenaline concentrations and drip-rates. They are spaced at 2 or 4 mg. intervals, these being the contents of the ampoules supplied.

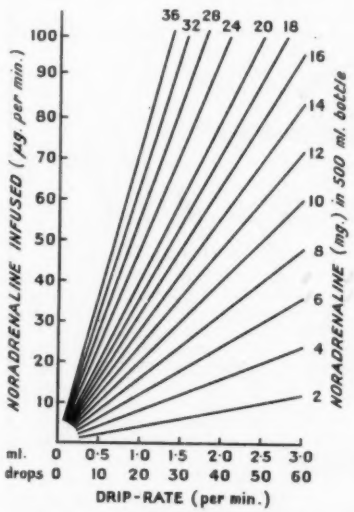

Fig. 3—Noradrenaline dosage chart. Diagonal lines represent millilitres of levophed in each half-litre bottle since each millilitre contains 1 mg. of active noradrenaline base. Using the appropriate line, the rate at which noradrenaline is being used can be read off the graph, provided the drip-rate is known.

Once the systolic pressure has been raised to about 130 mm. Hg, and maintained there by adjusting the drip-rate, the actual rate at which noradrenaline is being given can be read off the chart. This enables future requirements to be assessed. If the drip-rate and systolic pressure are recorded by the nurses at half-hourly intervals once the systolic pressure has settled, it is possible to calculate the changing dosages of noradrenaline being used and prepare the next bottle well in advance. When the dosage has fallen to about 5 μg. per min. the drip can be discontinued to see if the blood-pressure is maintained spontaneously.

Fluid Vehicle

Because L-noradrenaline breaks down in an alkaline medium, it should be given in 5% dextrose (West 1952) or dextrose-saline. If intravenous physiological saline, blood, plasma, or antibiotics are to be given it is probably wise to give these into another vein, despite the added discomfort to the patient (Ritchie 1956). If this is impossible, the two infusion sets can be linked by a glass Y-piece near the vein. It is important to adjust the relative heights of the infusion bottles to prevent reflux of one solution up the other tube. Alternatively, the L-noradrenaline can be introduced into the other drip tube through an intramuscular needle inserted near the entry into the vein.

Steroid Therapy

Peripheral circulatory failure in patients in addisonian crisis, hypopituitary coma, or myxœdema coma may respond to intravenous hydrocortisone alone. If, however, hypotension persists, it seems reasonable to use noradrenaline as well.

Ramey et al. (1951) have shown that adrenal cortical extracts potentiate the blood-pressure response of adrenalectomised dogs to noradrenaline, and Fritz and Levine (1951) have shown that, in adrenalectomised rats, the refractoriness of the blood-vessels of the mesoappendix to noradrenaline is abolished by adrenal cortical extracts, but not by deoxycortone. In man, Howland et al. (1956) have treated hypotension during operation with intravenous hydrocortisone and restored the blood-pressure to near normal levels. They believe that prolonged hypotension which fails to respond to vasopressor drugs is a sign of adrenal cortical insufficiency. But only one of the seven patients reported was given noradrenaline, and it is doubtful if the dosage was adequate.

If patients fail to respond to a reasonable concentration of noradrenaline, or become refractory to it later, it would seem logical to assume that adrenal insufficiency has supervened and to try to restore the responsiveness of the vessels by steroid therapy. This can be done most rapidly by infusing 100 mg. of hydrocortisone in 500 ml. of 5% dextrose, following this with further cortisone by mouth or intramuscularly. Steroid therapy should be continued until the patient has been weaned off noradrenaline, and then slowly withdrawn.

Summary

Two cases of peripheral circulatory failure with impaired renal function are reported. Both patients recovered after hypotension had been treated with noradrenaline.

It is suggested that with administration of noradrenaline the increased renal blood-flow following restoration of normal blood-pressure more than compensates for the local vasoconstrictor action of this drug on the renal vessels.

I thank Mr. P. M. G. Russell for permission to report the first case, and Dr. C. M. Seward for permission to report the second case and for advice and criticism; Miss M. M. McCready for all the biochemical estimations; and the nurses of the Royal Devon and Exeter Hospital for their coöperation in treating these patients.

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MASSIVE HÆMORRHAGE IN CHRONIC CONGESTIVE HEART-FAILURE FOLLOWED BY SODIUM DEPLETION

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A PATIENT with congestive cardiac failure had a massive hæmorrhage into her right pleural cavity after a thoracentesis. Transfusion, with an amount of blood calculated to be about equal to that shed into the chest, was not followed by clinical improvement. Cortisone was given and later salt. The patient recovered, but died six weeks later from a pulmonary embolus.

Case-report

A woman, aged 49, had an attack of rheumatic fever at the age of 7 years, after which she was well and led a normal active life until 1945, when her ankles began swelling and she was becoming rather tired. Intermittently thereafter her ankles became swollen, and in 1947–48 she was becoming short of breath on exertion. This gradually increased, and she was first seen as an outpatient in 1950, since when she had been taking digitalis. At that time she was diagnosed as having mitral stenosis and incompetence and aortic incompetence with auricular fibrillation.

She had been admitted to hospital in November, 1953, in congestive cardiac failure and with a right pleural effusion. In the next two years she was in hospital seven times, and on each occasion she was in congestive failure with distended neck veins, œdema, and a massive right pleural effusion. On the last three admissions she also had ascites. Both pleural and ascitic fluids were tapped on each occasion, sometimes more than once. Over this period 43·1 litres of fluid was removed.

Since 1951 the patient had been given regular injections of a mercurial diuretic and since 1954 ammonium chloride 1 g. three times daily.

In March, 1955, her total exchangeable body-potassium was estimated by using the radioactive isotope ^{42}K (Flear et al. 1957) and found to be significantly lowered, and since then she had been receiving potassium chloride 1 g. by mouth three times daily. In view of the protein loss incurred by the recurrent tapping of effusions (more than 840 g.) the patient was given 'Casilan' and advised to take one or two eggs each day in addition to her meals. She was finally admitted on Jan. 26, 1956, because of congestive cardiac failure with considerable ascites, right pleural effusion, and œdema of the legs and the sacral regions. Her neck veins were distended to the level of the angle of the jaw when she sat up.

On admission her hæmoglobin was 11·4 g. per 100 ml., serum-urea 48 mg. per 100 ml., serum-sodium, serum-potassium, and serum-chloride 134·0, 4·6, and 99·0 m.eq. per litre respectively, serum-albumin 4·2 g. per 100 ml., and serum-globulin 1·8 g. per 100 ml. Electrocardiography confirmed the presence of auricular fibrillation, rate about 90 a minute, and showed depression of the S–T segment in leads 2, 3, VF, and V4–6. Chest radiography showed a massive right pleural effusion occupying most of the right hemithorax, displacing the heart to the left, and almost completely obscuring the underlying lung.

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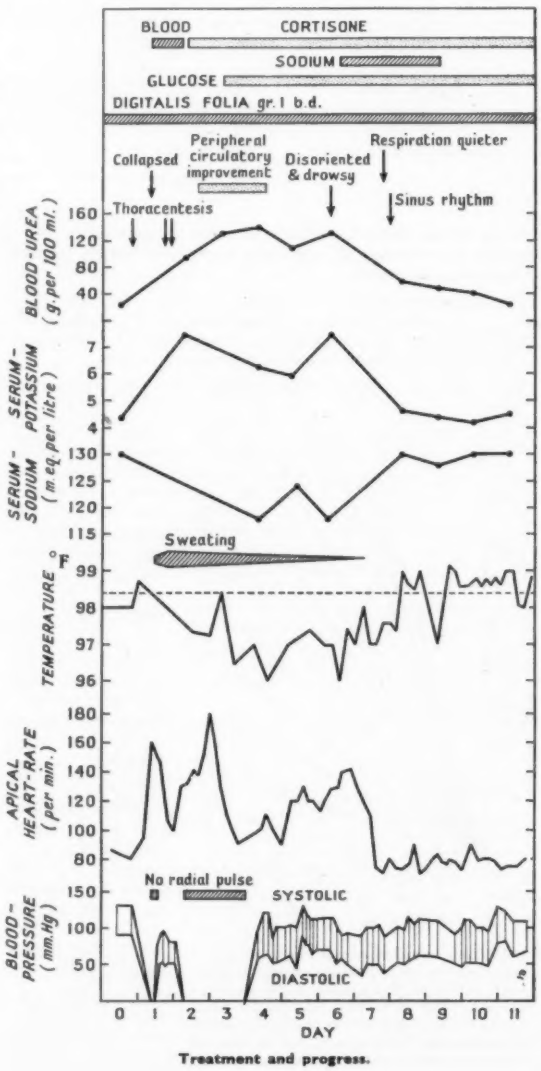
Treatment

As on her previous admissions she was given anticoagulant therapy. During the seventeen days following her admission three thoracenteses and one abdominal paracentesis were done, 13·7 litres of fluid being withdrawn in this way, 8·5 litres of it from the chest. During this period her weight decreased by 21 lb.

After the third thoracentesis a considerable pleural effusion still showed on radiography of the chest; so a fourth thoracentesis was done at 4 P.M. on Feb. 12 (day 0 in the accompanying table and figure). Towards the end of the aspiration the fluid was bloodstained.

Progress

Her pulse-rate and blood-pressure remained steady over the next six hours. Next morning, eighteen hours later (at 10 A.M. on day 1), she collapsed. She had not been too well during the night, and her pulse had been a little weaker than usual at 7 A.M. and again at 9 A.M. She was sweating profusely and was extremely pale. She was cold, her blood-pressure was unrecordable, and her radial pulses were impalpable. Her heart-rate, counted at the apex, was 160 a minute. Her peripheral veins were collapsed and did not fill easily when obstructed by digital pressure, and her respirations were rapid. She was, however, fully conscious and coöpera-



Treatment and progress.

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FLUID INTAKE, URINARY EXCRETION, HÆMOGLOBIN, AND CORTISONE TREATMENT

Day no.	Fluid intake (ml.)	Urine							Hb (g. per 100 ml.)	Endogenous creatinine clearance (ml. per min.)	Cortisone (mg.)
		Volume (ml.)	Sp. gr.	Total osmolarity (m. osmol per litre)	Sodium (m.eq.)	Potassium (m.eq.)	Chloride (m.eq.)	Urea (g.)			
0*	2040	850	..	..	5·2	6·1	..	..	10·5	..	..
1	1445	350	..	..	..	..	..	..	6·7	..	..
2	2195	80	..	..	..	..	..	..	20·1	..	200
3	2200	261	1·013	360	0·8	14·4	8·0	1·8	17·9	..	200
4	2255	688	1·014–1·022	390–505	1·4	35·4	5·0	9·0	16·7	..	200
5	1660	629	1·011–1·028	510–610†	0·8	18·6	6·3	13·8	17·3	35	150
6	1520	649	1·010	470	0·8	17·0	11·9	10·6	14·6	..	150
7	3348	636	1·013–1·021	560–590	1·9	24·0	10·6	12·5	..	..	75
8	3701	898	1·012–1·015	440	2·9	35·5	10·9	17·8	14·0	..	50
9	2343	836	1·020–1·022	580	2·5	37·3	16·1	20·9	14·6	..	75
10	2938	620	1·020–1·024	610	3·2	29·8	22·0	12·3	14·6	..	50
11	2151	586	1·015–1·022	610	2·7	27·7	23·9	14·7	14·2	55	50
12	2125	789	1·012–1·021	570	2·8	28·4	24·6	15·8	14·0	..	..
13	2615	1186	1·014–1·016	610	41·0	81·8	142·0	13·1	13·3	..	..

* Day of thoracentesis.
† Serum total osmolarity = 305 m. osmol per litre.
Sugar was absent from all urine passed.
Occasional red cells were seen in urine passed on day 3 only; casts in urine passed on days 3 and 4.
Albumin + + in some of the urine passed on days 3, 4, and 5, and + on days 6, 7, 8, and 9.

tive. Her right chest was dull to percussion all over, and it was obvious that she had bled into the pleural cavity. Her hæmoglobin had decreased to 6·7 g. per 100 ml., and her prothrombin activity was 33%. Intravenous vitamin K_1 10 mg. was given, followed by intramuscular vitamin K_1 10 mg. t.i.d., and a blood-transfusion was started with some difficulty through two drips with pumps attached to each. Owing to venous constriction it took twelve hours to give the first 8 pints. At first the patient responded well, her colour began to improve, her pulse became palpable at the wrists, and her blood-pressure rose to 80/50 mm. Hg. Her heart-rate fell to about 95 a minute. She relapsed in the early hours of day 2, when her trachea was displaced to the left and her breathing was more difficult. She was also somewhat cyanotic, and her heart-rate was 130 a minute. Thoracentesis was done and 1·5 litres of fluid, containing hæmoglobin 7·2 g. per 100 ml. was withdrawn., This was followed by improvement in her general condition, and a further 1·5 litres was withdrawn later in the day.

By 9 A.M. on Feb. 14 (day 2) twelve bottles of blood had been transfused, and she was being given her thirteenth; but she remained collapsed. Her face was still pale, though much less so than twenty-four hours previously, and her hands and feet were cold and cyanotic. She was still sweating profusely. Her neck veins were distended to the angle of the jaw on the right side but only half-way up her neck on the left (the level to which they had been before Feb. 12 (day 0)). She appeared moribund, though still fully conscious and oriented. Her radial pulses were again impalpable, and her blood-pressure could not be determined. Her heart-rate was 130 a minute. No more blood was transfused, because it was thought that the blood lost into the chest had been replaced. Her hæmoglobin was 17·5 g. per 100 ml. in venous blood and 20·1 g. per 100 ml. in capillary blood. She was given cortisone 200 mg. a day by mouth, and this was followed, during the next six hours, by improvement in her clinical condition and peripheral circulation.

Further improvement took place over the next seventeen hours, particularly in the circulation to the extremities; but, by 10 A.M. on day 3 it was still impossible to record her blood-pressure and to detect her radial pulses. Her hands were now warmer and pinker, and there was a quick return of blood to areas blanched by pressure.

Her radial pulses, which had been absent for fifty-six hours, returned by 9 A.M. on day 4, when her blood-pressure, unrecordable up to then, was 90/55 mm. Hg. By this time her twenty-four-hour urinary output, which had been poor, had returned to volumes similar to those before the bleeding. The table records data relevant to kidney function. The heart-rate was then 90 a minute. Later on day 4 and on day 5, however, her heart-rate rose to 120 a minute. The serum-sodium level on day 4 was low (118 m.eq. per litre) and serum-urea level 138 mg. per 100 ml.

On days 5 and 6 her heart-rate increased and her general condition deteriorated, and on day 6 she had mental confusion and drowsiness and felt weaker. It was estimated (Black 1953) at this stage that she had a sodium deficit of about 650 m.eq., and 178 m.eq. of sodium was given as sodium bicarbonate orally on the night of day 6. Her condition improved, and she was given the remainder of the calculated deficit early on day 7. During day 7 her heart was regular at a rate of 85 a minute. Her serum-sodium level rose to 130 m.eq. per litre and her blood-urea level fell to 34 mg. per 100 ml. During the subsequent days she progressively became much less tired and began to read and to take an interest in her surroundings. The administration of further sodium had no effect on her serum-sodium level or her clinical condition. Her renal function improved (see table), and her general condition nine days after collapsing was better than before her thoracentesis.

Her subsequent course was very good until, six weeks later, she died suddenly after an attack of pain in her chest. No necropsy was done, but she was thought to have had a large pulmonary embolus.

Discussion

It has been routine practice for many years in this ward to maintain all patients with congestive failure on anticoagulant therapy. Many such patients have had repeated aspirations of fluid from accumulations in chest and abdomen, and in none previously has there been any significant bleeding.

In this patient the extent of the bleeding was not recognised until she collapsed, because much of the bleeding took place overnight. Her hæmoglobin at the time of collapse was 6·7 g. per 100 ml., compared with 10·5 g. per 100 ml. the day before (see table), suggesting that there had been considerable hæmodilution. The patient received 13 pints of cross-matched blood, and it is unlikely that the blood lost into her right hemithorax could have been much more than this. After aspiration of about six pints from the thorax there was still obviously much more remaining. More was not aspirated because by then her respirations were not being embarrassed by the effusion, and as it was felt that further aspiration might precipitate further bleeding.

Despite adequate replacement of blood, however, initial improvement was not maintained, and the patient was moribund and pulseless, with unrecordable blood-pressure and pronounced peripheral vasodilatation. Her condition called to mind the picture of experimental "irreversible shock" in animals (Wiggers 1950) which supervenes on blood-loss of some duration. Lasché et al. (1951) have reported adrenal insufficiency in chronic heart-failure, and it was thought that acute prolonged oligæmia, superimposed on the "stress" of heart-failure, might have led to exhaustion of the suprarenal glands. This condition is associated with peripheral vasodilatation (Remington 1951) and hypotension unresponsive to the usual forms of therapy (Steenburg and Moore 1955). Cortisone was given and there did appear to be a general

improvement. Noradrenaline was not given to raise the blood-pressure, because blood-vessels lose their responsiveness to it in the absence of corticosteroids (Ramey et al. 1951, Fritz and Levine 1951, Zweifach et al. 1953), which appear to play a permissive rôle in the maintenance of vascular tone (Williams et al. 1954). Moreover noradrenaline decreases renal blood-flow, which was to be avoided.

This patient appeared to have developed, by the fourth to sixth day after bleeding, a true depletion of sodium even though she was in congestive failure with systemic œdema. She was sweating profusely for six days and had been taking water by mouth but no significant amounts of sodium. In heavy sweating a person may lose several litres a day containing as much as 40–50 m.eq. of sodium per litre. Although the daily urinary excretion of sodium decreased during the period of profuse sweating, a considerable amount of sodium must have been lost. Cort and Matthews (1954) have warned that giving sodium to hyponatræmic patients who are in congestive heart-failure and not excreting sodium, and in whom there is already some œdema, may do little more than increase the œdema, as Elkinton et al. (1952) found in some patients, although other patients improved with salt, and their œdema did not increase. Black and Litchfield (1951) gave salt to patients who had been admitted with congestive failure and in whom œdema had subsided but who had deteriorated clinically and showed low serum-sodium levels. There was resulting improvement without return of œdema.

Accordingly caution was exercised in giving sodium. It was, however, followed by clinical improvement in well-being, mental function, and heart-rate. The serum-potassium and serum-urea levels fell, and the serum-sodium level rose. There was no detectable further increase in œdema, the distension of the neck veins did not increase, and the lung base remained clear.

The sodium depletion was probably only relative because, with a similar degree of œdema a year previously, the patient's total exchangeable mass of sodium had been about 360% of the mean normal value (Flear et al. 1957). In the presence of œdema and with a serum-sodium level of 118 m.eq. per litre the body-sodium is unlikely to be less than normal. The depletion is therefore regarded as an acute lowering of the serum-sodium level from the loss of sodium.

For a time (days 1–3) the patient passed very little urine in spite of an unrestricted intake of fluids by mouth. This was probably partly due to heavy sweating, but some renal damage may have resulted from the early period of oligæmia on day 1, when her blood-pressure was unrecordable for four hours. A lowered filtration pressure in the glomeruli may also have been a contributory factor. At this stage the blood-urea level was 90 mg. per 100 ml. and the serum-potassium level 7·5 m.eq. per litre.

Despite the absence of recordable blood-pressure for about sixty hours there was little evidence of any significant damage to the kidneys. Thus casts, red blood-cells, and albumin were present in the urine for only a few days. The kidneys continued to deal with the electrolytes differentially, and their concentrating power also appeared satisfactory. Presumably, in the absence of oligæmia, the renal blood-flow, when the blood-pressure was unrecordable, was sufficient to prevent damage from anoxia, just as the cerebral circulation was sufficient to keep the patient conscious, rational, and coöperative.

This case draws attention to some of the consequences of delay in replacing lost blood. Chronic congestive failure is not a contra-indication to the rapid and complete replacement of blood after hæmorrhage, and in this patient there was never any evidence of a rise in venous pressure or of pulmonary œdema. Sodium depletion resulted from excessive sweating, and a full recovery was not made until sodium had been replaced adequately as well as blood.

We wish to record our appreciation of the help afforded by Sister V. J. Humphries and her staff in the care and study of this patient, who was in the care of Dr. O. Brenner, consultant physician to Queen Elizabeth Hospital, to whom we are indebted for permission to publish and for advice in presentation. Dr. H. J. Yardley, late of the department of experimental pathology in the University of Birmingham, kindly undertook estimations of osmolarity. Other investigations were made by the departments of biochemistry and hæmatology at the hospital.

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POTT'S PARAPLEGIA OF FIFTY YEARS' DURATION

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THE outlook for a patient with unrelieved Pott's paraplegia is poor at the present time; fifty years ago many would have considered it hopeless. The following case is therefore of interest.

Case-report

History

Born in 1899, the patient was a normal child until he was 3 years old. But at 3 years 8 months he attended the Royal National Orthopædic Hospital because of weakness of his leg and a feeling of "sand in his shoes." The hospital wished to admit him but his mother could not afford it. Instead he was placed on a Bradford frame on which he lay at home for about a year.

At the end of this time he could walk a few steps and was sent to a convalescent home. He lay there for many weeks in a special box. He was very miserable and received no teaching, and returned home about a year later, incontinent and dirty. His mother then nursed him until he was 7, when he was admitted to St. Thomas's Hospital. Two operations for a paravertebral abscess were performed (details not available). The wounds had not fully healed when he went home some months later and he still had paraplegia.

In August, 1907, at the age of 8, he was admitted to Cheyne Walk Hospital for Sick and Incurable Children, and for seven years he lay there flat on his back, with weights on his legs and a bottle between them. His education was entirely fortuitous, depending on Society ladies who, out of charity, adopted his cot and taught him to read, write, and crochet. He still, fifty years later, corresponds with his benefactors.

In 1914, after a change of staff in the hospital, he got up in a jacket and gradually became mobilised in a wheel-chair. This mobilisation, after seven years on his back, took three years, and he was discharged at the age of 18. Three months' convalescence was paid for by his self-appointed guardians who also sent a wheel-chair. By much determination he was able to get around the meadows and keep himself clean. He kept careful watch on his bowels and regulated them by noticing the action of his diet, much as a patient with a colostomy controls its action. He had a slight warning before defæcation.

Fig. 1—Present condition showing old operation scar over dorsal kyphus and typical posture adopted at rest. The wasting and deformity of the lower limbs contrast with well-developed upper trunk and arms.

Fig. 2—Radiographs of spine. Old tuberculous caries of lower dorsal spine and almost complete destruction of T6–12, with marked angular kyphus and an old calcified paravertebral abscess at this level.

He returned home in 1917 and remained with his mother till her death in 1952. He was given a typewriter by his sponsors, and taught himself to type with the aid of an instruction book. He gradually began to make an income by typing, knitting, and crochet work. His health remained fairly satisfactory except for occasions when he was troubled by episodes of loin pain and shivering attacks. For these he took aspirin and hexamine tablets, prescribed by his doctor.

Some time in 1931, his pain and fever became more severe and his urine cloudy. On his own initiative he bought a catheter, carefully cleaned it, lubricated it with soft paraffin carbolic vaseline, and passed it on himself, copying the action he had seen many years before when he had been in hospital. Filthy urine escaped, and he was so amazed at the relief that he decided to continue the practice. He found that, if he did this night and morning, he was dry between catheterisations and need no long carry a bottle around.[4] He continued this until July, 1955, when he was unable to pass his catheter. If the bladder was allowed to get over-distended, he had flexor spasms of his legs, sweating, and general discomfort. This provided some warning but the spasms made catheterisation harder. A no. 8 catheter was normally used, a no. 7 being kept in reserve for difficult occasions.

Since 1933, he has led an active life, using a 'Merlin' chair indoors and a wheel-chair outside. He usually wears a plastic spinal support. Since the death of his mother in 1952 he has lived with his brother. He has a separate upstairs room and conducts his own affairs. He types sections for the *Encyclopædia Britannica* and is secretary of a Bible-reading class.

He was admitted to the West Middlesex Hospital in July, 1955, with retention of urine after he had failed to pass a catheter.

Examination

He was a small, alert, cheerful man in good general health, with a rather pigeon-shaped chest but no evidence of pulmonary disease (fig. 1).

Spine and upper limbs.—He had severe kyphosis in the region of the sixth to tenth thoracic vertebræ, and an irregular linear scar about 6 in. long over this region (presumably the site of operations for paravertebral abscess). The upper limbs were well developed.

Pelvis and lower limbs.—The paralysed lower limbs and buttocks were grossly wasted. An irregular scar overlay the left greater trochanter, the site of previous pressure sores. The right hip was dislocated with 2 in. shortening of the right leg. Both hips had 50° fixed flexion deformity, but full

Fig. 3—Radiograph of lumbar spine and pelvis. The lumbar spine is unaffected but the right sacro-iliac joint shows evidence of old tuberculous disease. The dislocated right hip, prostatic calculi, and calculi, and calcified mesenteric glands are clearly shown, but no opaque renal calculi.

a b

Fig. 4—Radiographs of foot and knee. Note, in the foot (*a*), the small size, and the gross subluxation at mid-tarsal joints, and in the knee (*b*), the distribution of osteoporosis and Harris's lines.

passive flexion was possible. There was also 20° fixed adduction and internal rotation of the right hip, but almost full adduction and 20° abduction were possible in the left hip. Both knees had flexion contractures, the right 50° and the left 40°. Full passive flexion was possible. The feet were both very small and were dislocated at the subtalar joint with 90° inversion. The feet were 7½ in. long and the tibiæ 6 in. long—measurements similar to those of a child aged 6.

Neurological examination revealed complete paraplegia at the neurological level of T7, with no abnormality above this level. Below it there was complete loss of sensation to pinprick, posture, and vibration. Pinprick in the lower limbs produced a cross extensor response by which the patient knew that something was happening.

The reflexes were normal in the arms, and the knee-jerks were brisk and equal. The ankle-jerks and abdominal reflexes were absent, and the plantar responses doubtful. There was a slow response in the sphincteric reflex.

Obvious muscle-wasting accompanied complete paralysis of all muscles below the level of sensory change. The excellent function of his upper limbs, however, enabled him to move the matchstick lower limbs into a suitable position with a quick flick of the wrist and to move about with great agility.

Investigations

Culture of the urine produced a heavy growth of *Streptococcus fæcalis*. The blood-urea was 25 mg. per 100 ml. and the hæmoglobin 13·0 g. per 100 ml.

A plain X-ray film of the abdomen showed prostatic but no renal calculi. Radiological features are illustrated in figs. 2–4.

Course

Bougies were passed, with some difficulty owing to a tight posterior stricture, and a Foley catheter left in for seven days. A course of sulphafurazole (' Gantrisin ') tablets was followed by aureomycin for five days.

Further investigations were felt unjustifiable in a patient who was able to look after himself so satisfactorily. After some difficulty on the first two or three occasions, he was able to re-establish his catheterisation routine and was discharged home.

Discussion

Among the unusual features of this case are :

1. Survival despite inadequate treatment and a very poor prognosis.
2. Absence of renal calculi or gross urinary infection despite many years' recumbency, and self-catheterisation for twenty years.
3. Paralytic dislocation of the right hip.
4. Deformities and absence of growth of the lower limbs associated with paralysis and disuse.
5. Rehabilitation to a self-supporting cheerful existence.

Prognosis of the paraplegia.—The complete flaccid paralysis, the sphincter disturbance, and the loss of vibration sense gave a poor prognosis for neurological recovery.

Prognosis for life.—The mortality-rate in various series of cases of Pott's paraplegia is given as 21% (Butler 1935, Seddon 1935), 25% (Dobson 1951), and 28% (Girdlestone 1940); in the series reported by Bosworth et al. (1953) there were many advanced cases and the mortality-rate was over 60%.

Urinary infection and stones.—Guttman (1953) states that 22% of paraplegic patients develop renal calculi, and it is remarkable that our patient, during several years' recumbency, did not do so. Occasional attacks of pain are probably due to mild recurrent urinary infection but up till his recent admission no long courses of antibiotics had been given. That careful daily catheterisation can be so innocuous corroborates statements by Girdlestone and Somerville (1952). In this case no satisfactory automatic bladder was developed.

Paralytic dislocation of the right hip.—It seems likely that the dislocation of the right hip was a result of paraplegia. Blundell Jones (1954) records such a dislocation in children with flaccid or spastic paraplegia. It is usually accompanied by a valgus deformity of the femoral neck and is more common in children paralysed before the age of 2. It is attributed to lack of the moulding forces in the bone which are produced by normal muscle tone on weight-bearing.

Deformities of the lower limbs are caused by osteoporosis, lack of growth, and muscle imbalance.

Abramson and Kamberg (1949) attributed the bone changes to osteoporosis—i.e., disturbance of the laying down of the bony matrix, rather than an alteration in the calcium deposition in bone; but they found that osteoporosis was commonly associated with soft-tissue calcification and formation of renal stones. These changes were largely prevented by ambulation within two years of injury. Lack of growth is probably due to epiphyseal arrest, which is another result of long-continued immobilisation (Gill 1944, Sissons 1952).

The feet also show changes resulting from osteoporosis, lack of growth, and muscle imbalance. The adduction and inversion deformity is probably the result of prolonged invalid posture. It causes little inconvenience since the legs are no longer used.

Rehabilitation.—Special hospitals have provided new hope for paraplegic patients. This case illustrates how much can be done by simple determination alone, and provides many useful reflections for those confronted with such extreme disability.

I should like to thank Mr. W. J. Ferguson, M.S., of the West Middlesex Hospital, for permission to publish this case, and Mr. J. I. P. James, M.S., of the Royal National Orthopædic Hospital, for his helpful criticism.

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Medical Societies

ROYAL SOCIETY OF MEDICINE

Aortic Stenosis

A MEETING of the society's section of medicine on April 18, with Dr. G. E. BEAUMONT in the chair, discussed aortic stenosis.

Dealing with the medical aspects, Dr. RAYMOND DALEY said there was a history of rheumatic fever in more than half his cases and a predominance of males. Death occurred between one and two years after the onset of symptoms. He emphasised the frequency of sudden death, presumably from ventricular fibrillation. He thought that the finding of a thrill in the neck was much more important than that of a thrill in the aortic area. The largest group of patients lay between the ages of 40 and 59 years, and of 23 patients in this group 18 had calcification of the aortic valve. He had studied the brachial-artery pressure pulse and while prolongation of the upstroke time was a good indication of aortic stenosis, there were many other factors to be taken into account such as the dynamics of the left ventricle and the characteristics of the recording system. Using Mr. Ian McMillan's system of taking cine photographs of the aortic valve, as well as other hæmodynamic data, they had come to the conclusion that the critical orifice size was 0·5 sq. cm. Dr. Daley divided cases of aortic stenosis into four groups depending on severity. In the first group the orifice was greater than 0·5 sq. cm. and there were no hæmodynamic effects. In the second

group the orifice was less than 0·5 sq. cm., there were no symptoms, and there were no changes in hæmodynamics, except following effort, when the end diastolic pressure rose in the left ventricle. In the third group there were symptoms, and in the fourth group there was failure of both left and right ventricles.

Mr. ANDREW LOGAN discussed the surgical treatment of aortic stenosis. He had performed an aortic valvulotomy, as he called it, in 31 cases. In 7 he believed the condition was congenital, and in 17 acquired; in 7 the aortic stenosis was accompanied by mitral stenosis. In 6 of the 7 congenital cases subaortic stenosis was thought to have been excluded by angiocardiography; in 5 of them aortic incompetence was produced or increased, but all had improved for the duration of the follow-up period (at least three years). In 1 patient there was gross dilatation of the heart in the immediate post-operative period, but it later returned to its preoperative size. The indication for operation in this group had been evidence of extreme left ventricular hypertrophy on the electrocardiogram. In the 7th patient unfortunately no angiocardiogram had been performed, subaortic stenosis was found at operation, and sudden death occurred five hours later. In the 17 patients with acquired pure aortic stenosis the symptoms were such that none of them were expected to survive more than eighteen months without the aid of surgery. 15 out of the 17 had calcified aortic valves, 9 had died, 4 in the immediate post-operative period or during the operation. Of the 8 survivors all had some increase in aortic regurgitation, but 5 had improved from the symptomatic point of view and 1 had lost all symptoms although he had been in heart-failure with angina before the operation. Of the 7 patients with aortic stenosis and mitral stenosis there was improvement in all.

Mr. Logan said that he had been criticised as deducting a few months of life from one case of aortic stenosis to add it on to another by his surgical efforts, but he felt that the results in the surgery of aortic stenosis were not intolerable to any surgeon brought up on cancer. In order to get better results he would like to operate earlier, but since the prognosis was uncertain until late it would be necessary at this stage to make a series of those with a pressure gradient across the aortic valve of, say, 50 mm. Hg, and use alternate cases as controls. Describing his technique Mr. Logan said he incised the anterior wall of the left ventricle and introduced and opened a dilator in the aortic valve while the head vessels were clamped. He thought this was better than the use of a sharp instrument because it tended to select the commissures more accurately. He was impressed, however, with McMillan's work showing that if the aortic cusps were malformed valvotomy was useless. He noted that ventricular fibrillation was common and that cardiac massage was difficult because of the great thickness of the left ventricular wall. Immediate electric defibrillation was necessary. He concluded by saying that he felt that blind dilatation of the aortic valve produced as good results as any operative technique yet devised, including open surgery under hypothermia.

Dr. J. F. GOODWIN discussed work done with his colleagues at the Postgraduate Medical School, Dr. Abdin, Dr. Nielson, and Dr. Doyle. The cardiogram in severe aortic stenosis showed deeper T-wave inversion (due to myocardial ischæmia) than in hypertension and coarctation. A deep S wave in lead V5 indicated additional right ventricular hypertrophy. In severe stenosis the systolic upstroke time of the arterial pulse varied directly with the pulse-pressure, but this was not true for mild stenosis or incompetence. Measurement of systolic upstroke time in relation to the pulse-pressure in a number of beats during the Valsalva manœuvre was a better guide to the severity of stenosis than examination of the resting pulse-wave.

Mr. W. P. CLELAND said he had performed an aortic valvotomy on 15 patients. In 1 the ætiology was believed to be congenital, in 9 there was pure calcific aortic stenosis, and in 5 there was additional mitral stenosis. 3 patients had died and in the remainder the longest follow-up period was three years. All patients were in Dr. Daley's third group, and he disagreed that they should have been in the second group. He was fairly optimistic about the results; all the patients were holding their own. The pressure gradients across the aortic valve varied between 50 and 150 mm. Hg, and he was content with a 50% reduction in the gradient, since it was dangerous to go too far in these cases. He thought that the trans-ventricular approach with a blind operation was satisfactory, but he hoped in the future to have a bloodless field and a still heart.

Dr. RONALD GIBSON said that at the Brompton Hospital and at Guy's Hospital direct puncture of the left ventricle had been performed in 60 patients. The procedure was simple and safe, but the systolic pressure gradient across the aortic valve obtained by this method must be interpreted with caution.[1] The pressure gradient depended not only on the size of the orifice but also on the stroke-volume, which was related to cardiac output, heart-rate, and the degree of aortic regurgitation. A gradient of up to 100 mm. Hg had been found with dominant aortic regurgitation. There was little correlation between the size of the pressure gradient for the ejection period and the surgeon's estimate of valve size. This was due to differences in stroke volume. There was a good correlation between the calculated aortic valve area and the prolongation of corrected arterial upstroke time with estimated valve size.

Mr. IAN HILL had operated on 2 patients with isolated aortic stenosis and 10 with aortic stenosis and mitral stenosis. He had found it difficult to assess the severity of the aortic stenosis by manometry at operation because of the varying cardiac output, and he now passed a sound in order to assess the size of the orifice.

Mr. D. N. ROSS said that Sir Russell Brock had now performed 100 aortic valvotomies using the trans-ventricular approach.[2] He agreed with Mr. Cleland that one must not persist in trying to abolish the pressure gradient, because of the danger of ventricular fibrillation. He did not know the exact mortality figures but they were about 10%. They had used direct vision with hypothermia in about 15 cases of congenital aortic stenosis, and they had found a surprisingly high incidence of subaortic stenosis (11 cases out of 100). Calcification-of-valve stenosis was so common that if calcium was absent in a patient more than 30 years old, the stenosis was probably subvalvular, and this could be confirmed by taking withdrawal pressure tracings across the aortic valve on the operating-table. Subaortic stenosis was treated by splitting from below, using the transventricular route.

Mr. B. B. MILSTEIN noted the high mortality in the early cases and attributed it to their advanced nature (they were mainly in Dr. Daley's group 4). He did not now operate on patients with heart-failure unless this had been treated successfully for three months. Angina and syncope were usually relieved by valvotomy, but dyspnœa often remained and was attributed to fibrotic changes in the myocardium.

Dr. C. J. GAVEY emphasised the importance of the symptom of weakness in bad cases of aortic stenosis: it usually indicated a poor prognosis.

Mr. IAN MCMILLAN was asked about the varieties of abnormalities of the aortic valve as shown by his method of cinephotography: he replied that fusion of one commissure producing the fish-mouth type of stenosis was the most common and had been found in 28 out of 47 cases.

1. Fleming, P., Gibson, R. *Thorax*, 1957, **12**, 37.
2. Brock, R. C. *Brit. med. J.* May 4, 1957, p. 1019.

ASSOCIATION OF CLINICAL PATHOLOGISTS

THE 58th general meeting of the association was held at Torquay on April 11.

Radioactive Materials and the Pathologist

Introducing a symposium on this subject, Prof. D. H. COLLINS (Sheffield) said that where possible the pathologist should collaborate with a team of medical scientists and physicists, but the use of isotopes would undoubtedly become wider and every pathologist should know about them. To enable him to assess the risks the pathologist must be informed of the radiation history of every piece of potentially radioactive tissue, cadaver, or other biological material coming into his department. The purpose of the symposium was to arouse the interest of clinical pathologists so that they might play their full and proper part in the coming era of radiation medicine.

Discussing the injurious biological effects of radiation Dr R. H. MOLE (Harwell) said that interference with the processes of repair was a characteristic feature, and one basic problem was whether malignancy was a sequel to prolonged and inadequate repair or whether it was due to some sub-microscopic cellular change such as "mutation." Another characteristic feature was the time required for biological damage to show itself. The time-scale was even more drawn out in man than in animals, so that the sperm-count might be at a minimum six to ten months after a sublethal exposure. A limited exposure to radiation in early adult life might shorten the life span. In fact the sequels of low-level irradiation might conveniently, if not very illuminatingly, be described as premature ageing. Experience had shown that 1 μg. of radium in the body might cause bone tumours. Thus 0·1 μg. was taken as the body burden which would not do harm—i.e., the maximum permissible level (M.P.L.) for occupational exposure. The M.P.L. for other radioactive materials—e.g., radioactive strontium—was based on this and took into account the amount of radiation energy absorbed in tissue, differences from radium in degree of uniformity of deposition, and metabolic differences in excretion and in uptake from food and water.

Dr. R. C. CURRAN (Sheffield) said that many of the radioactive isotopes in use in hospitals were given in trace doses; and though it was always wise to avoid all unnecessary radiation in view of the lack of knowledge of the effects on man of even a small increase over his "normal" radiation background, the hazard from handling these was comparatively slight. Some isotopes, however, including ^{131}I, ^{198}Au, and ^{90}Y, were given in far greater doses for therapeutic purposes. When the pathologist was asked to examine a surgical specimen or perform a necropsy on a body containing such large quantities of radioactive material, it was essential for him to have all relevant information. The hospital physicist should determine the residual radioactivity. After dissection of a highly radioactive specimen, all appropriate areas of these departments should be monitored by the physicist, who would detect any persistent foci of radioactivity that must be eliminated.

Control of the Hypothermic State

Dr. P. I. REED (London) described investigations carried out in the department of neurosurgery of the Maida Vale Hospital on 31 patients undergoing craniotomy under hypothermia for vascular abnormalities. The study was designed to demonstrate possible differences in biochemical findings compared with cardiac surgery, and to show what screening tests, if any, were of value in anticipating any of the recognised or theoretical complications of hypothermia. Significant changes were found in the serum-bicarbonate, blood-sugar, and blood-urea levels, the bicarbonate decreasing from 28·0 m.eq. per litre preoperatively to 24·2 at 27·5°C and 24·4 postoperatively; the blood-sugar rose from 107 mg. per 100 ml. to 207 at 27·5°C and 148 postoperatively, and blood-urea from 25 mg. per 100 ml. to 30 and 40 respectively. Changes in sodium, potassium, calcium, chloride, prothrombin, fibrinogen, coagulation-time, and platelet-count were not significant. Neurosurgical patients were much less prone to acid-base imbalance than those who had undergone cardiac surgery stimulating ventricular fibrillation, and they were less likely to develop liver damage and in consequence less prone to abnormal bleeding. The following tests were therefore worth carrying out: serum potassium and bicarbonate before and during hypothermia (as a guide to correcting acidosis) and blood sugar and urea (to exclude diabetes and early uræmia respectively). Other tests were indicated only when complications unassociated with hypothermia were suspected. There was at present no way in which the laboratory could anticipate any danger due to hypothermia itself, apart from helping to exclude those patients in whom hypothermia was contra-indicated.

Tryptophan Metabolism in Phenylketonuria

Dr. C. M. B. PARE, Dr. M. SANDLER, and Dr. R. S. STACEY (London) presented evidence of a defect in the 5-hydroxyindole pathway of tryptophan metabolism in phenylketonuric patients. They showed that there was a significant decrease in serum 5-hydroxytryptamine (5-H.T.) levels and urinary excretion of 5-hydroxyindoleacetic acid compared with control groups. Surprisingly high levels of serum-5-H.T. were found in some mentally defective children in the control group. The low levels of circulating 5-H.T. might be related to mental deficiency in phenylketonurics, for certain evidence suggested that 5-H.T. was functionally important in the central nervous system. The improvement in mental function in some phenylketonurics on a low-phenylalanine diet might be related to the rise in circulating 5-H.T. which had been observed in a small number of patients undergoing this form of treatment. A possible form of treatment was the administration of 5-hydroxytryptophan, which passes the blood-brain barrier and is metabolised to 5-H.T. in the central nervous system. As a working hypothesis to explain the 5-H.T. deficiency, it was suggested that the defect in hydroxylation of phenylalanine may affect hydroxylation of tryptophan, either by providing competition for a limited hydroxylating mechanism or by the inhibition of tryptophan hydroxylase by phenylalanine or one of its metabolites.

Proteins of Normal Urine

In the technique of Grabar and Williams, proteins are first separated electrophoretically and then identified immunochemically by means of the precipitin reaction.

Dr. G. H. GRANT (Shrewsbury) had analysed in this way the urine proteins of a small number of normal men, women, and children, using three rabbit antisera prepared against serum proteins, urinary-tract proteins, and the Tamm-Horsfall mucoprotein respectively. Normal urine contained small quantities of a large variety of different proteins. Many were electrophoretically and antigenically identical with the serum-proteins. The glomerular pores must be much larger than used to be supposed, but they were apparently not wide enough to let through the large β-lipoprotein molecule. There were probably at least 3 proteins in the urine unrelated to the serum-proteins and so presumably arising from the urinary tract. The principal one was the mucoprotein described by Tamm and Horsfall, which was precipitated from normal urine on increasing the concentration of NaCl. The high proportion of "α-globuline" found in normal urinary protein by moving-boundary or paper electrophoresis was due not to differential tubular reabsorption of plasma-proteins but to urinary-tract protein.

Biochemical Treatment in Renal Failure

In the Glasgow Northern Hospital Group, in the past seven years, 12 obstetric cases out of 13 with acute renal failure have been successfully managed by conservative treatment. Dr. J. W. CHAMBERS (Glasgow) added that in the past three and a half years some 20 cases of uræmia had been treated and had recovered; all had normal serum-urea levels before discharge (except 2 with ureter transplanted to colon). Half these patients had acute renal failure; the others were mainly patients with renal insufficiency associated with severe electrolyte depletion or toxæmia. Maximum serum-urea levels ranged from 100 to 500 mg. per 100 ml. Half the patients were semicomatose or confused; and a third had an episode of circulatory failure. Treatment was guided by the principles and practice of Professor Bull, with special attention to rectification of electrolyte depletion as indicated by the history, clinical status, and biochemical findings. In 75% of cases the prognosis at the outset was very bad. 3 of the most severely ill patients were known to be well two and a half years later.

Blood-loss Following Trauma

Dr. ELIZABETH TOPLEY (Birmingham) said that comparison of different red-cell-volume techniques in parallel showed that equally accurate results were obtained using ^{51}Cr-labelled patient's blood, ^{51}Cr-labelled bottled blood, and ^{32}P-labelled patient's blood. Comparison of clinical assessments of blood-

loss with red-cell-volume studies had defined the common degree and timing of blood-loss in a variety of injuries, and had demonstrated the limitations of clinical assessment. Red-cell-volume estimates in burns might be inaccurate if more than 20% of the body-surface was involved. In spite of this, estimates six and twenty-four hours after injury had increased the usefulness of hourly hæmatocrits as a guide to plasma therapy during the shock stage in extensive burns. Inspection of a blood-film taken on admission helped to decide whether red-cell-volume studies were necessary. A loss of more than 25% of the normal red-cell volume had so far not occurred in patients showing less than 1% of microcytes (less than 3 μ) in the head of the blood-films.

Complications After Valvotomy

Dr. A. DICK and Dr. R. MATHIESON (Glasgow) discussed a series of 41 patients who were subjected to mitral valvotomy during the years 1952–56; 5 died within six months of operation. Histological examination of the auricular appendages revealed evidence of rheumatic disease in all, but of activity in only 1 of these 5. The necropsy findings indicated that 2 patients died of thrombotic lesions, 1 of cerebral emboli, and 2 of infection within three weeks of operation. In 1 of the infective cases two varieties of penicillin-resistant coagulase-positive staphylococci were isolated, one from the lung and pleural and pericardial cavities, and one from the blood. This patient had profound toxæmia which failed to respond to antibiotics, and at necropsy there was a fibrinous pericarditis and pleurisy, but the classical features of acute infection were absent.

Ulceration of the Œsophagus in the Newborn

Dr. G. R. OSBORN (Derby) said that ulceration of the œsophagus had not been observed in the embryo fœtus or in stillborn babies. It was not a consequence of shock. In babies born alive, ulceration was uncommon when they had not been intubated. If intubation was intermittent or of short duration, little damage might be done to the œsophagus. The incidence of ulceration in a nursing-home where intubation was often necessary was 12% when intubation was not undertaken to administer intragastric oxygen; 71% of babies treated with intragastric oxygen had ulceration of the œsophagus. Intubation caused pressure atrophy of the epithelium progressing to total destruction. Next, but very early, there was intense congestion, often associated with hæmorrhage into the muscularis mucosæ and main muscle coat. Later, large bacterial masses might form on the eroded surface, and the bacteria might invade the blood-stream or become obvious in the gastric mucus. Staphylococci were the most important.

Venous Thrombosis and Bed Rest

Dr. N. M. GIBBS (Derby) observed that venous thrombosis in hospital patients almost always involved the legs, and it was decided to try to correlate the site and incidence of venous thrombosis in the legs at necropsy with the duration of bed rest in hospital. The vessels of the legs were dissected in 239 cases in which the period of confinement to bed was accurately known. 163 patients had died within two weeks of admission to hospital, and the duration of bed rest was assessed to within twenty-four hours. The incidence of venous thrombosis rose to a peak in patients dying after one to two weeks' confinement to bed. 76 patients died after from two to twelve weeks in bed, and the age of the thrombi corresponded to the duration of bed rest. Venous stasis occurred in two distinct anatomical sites in the leg veins—the intramuscular veins, particularly those of the soleus muscle, and the common femoral vein and tributaries near the inguinal ligament. Dr. Gibbs concluded that the most important cause of venous thrombosis in the legs in hospital patients was venous stasis due to muscular inactivity. Most fatal emboli arose from the common femoral vein and tributaries near the inguinal ligament. Emboli detached from the legs were usually small and produced no symptoms.

The Doubtful Lymph-node

Dr. K. R. DEMPSTER (London) said that lymph-node-biopsy sections from 102 patients, previously reported either as "non-specific chronic inflammation" or as "doubtful," in the sense that a malignant lymphoma could not be excluded, had been re-examined and the patients followed up. 10 cases could be definitely diagnosed as malignant lymphoma (follicular lymphoma 3, Hodgkin's disease 4, lymphosarcoma 1, and reticulum-cell sarcoma 2), unequivocal evidence of which was obtained by later biopsy, splenectomy, or necropsy. Certain histological manifestations of chronic inflammation were particularly likely to cause confusion with malignant lymphoma. Reactive follicular hyperplasia was often mistaken for follicular lymphoma, but the uniform distribution of macrophages in the follicles and the presence of patent sinuses in the inflammatory condition were useful differential points. Many microscopical features of Hodgkin's disease were mimicked by the multiple abscesses of cat-scratch disease and lympho-granuloma inguinale. Sternberg-Reed cells were not found in inflamed glands and they indicated Hodgkin's disease.

Carcinomatous Neuropathy

Dr. A. L. WOOLF (Smethwick) had studied intramuscular nerve-endings by Coers's techniques in 2 cases of carcinoma. In 1, there was collateral reinnervation of denervated muscle-fibres with diffusely swollen nerve-fibres. "Strength-duration" curves indicated partial denervation of distal muscles of upper and lower limbs. Necropsy showed a bronchial carcinoma with carcinomatous infiltration of cervical, lumbar, and sacral spinal roots between the arachnoidal cul-de-sac and the ganglion. The cord (apart from wallerian degeneration from a metastasis in the pons), cauda equina, and dorsal-root ganglia were practically normal. There were many necrotic cerebral metastases, one bordering on the ventricle. The 2nd case presented as a predominantly sensory "peripheral neuritis." Muscle biopsy showed collateral reinnervation, many slightly oval swellings with dark lilac central and paler outer zones (methylene-blue) on the nerve-fibres and reduction of some end-plates to single approximately spherical masses. An anaplastic carcinoma was found in the bifurcation lymph-node. Plasma cells were mixed intimately with the tumour. There was posterior-column degeneration and severe loss of nerve-cells from the anterior horns. The medulla showed cellular nodules in the olives and other nuclei suggesting virus encephalitis, but further examination showed the nodules to consist of plasma cells developing Russell bodies and what were probably carcinoma cells. The carcinoma cells appeared to have been surrounded by plasma cells from the tumour stroma, during their passage through the blood-stream to the brain.

Reviews of Books

The Eye in General Practice

C. R. S. JACKSON, B.M., F.R.C.S.E, ophthalmic surgeon, Royal Infirmary, Edinburgh. Edinburgh and London: E. & S. Livingstone. 1957 Pp. 152. 21*s*.

THE talent to set out a complicated subject clearly and briefly is rare, but Dr. Jackson has succeeded almost completely in his attempt to discuss in 152 pages the aspects of ophthalmology relevant to general practice. Little of importance has been omitted and much matter, dear to ophthalmologists but of little concern to other doctors, has been left out.

In a preface he says his intention is to describe the common diseases of the eye, to show how to distinguish conditions which need hospital attention from those which can be safely treated by the family doctor, and to help the practitioner to interpret letters from a hospital eye-clinic and be able to reassure his patients. These aims have been well fulfilled.

The book has three main sections. In the first part, devoted to the diseases of the eye, an introductory account of examination is followed by chapters on each of the structures liable to disease and separate chapters on refractive error, squint, and glaucoma. That on squint (a subject about which there is too much complacency) is of special merit. Squint is not only a cosmetic problem which causes much needless emotional hardship to school-children but also the commonest cause of the "lazy" eye—that is, an eye which has usually lost all useful central visual acuity. Dr. Jackson emphasises how poor are the results when treatment is delayed and how good when it is early.

Part II is devoted to ocular manifestations of cardiovascular, endocrine, and metabolic diseases, and diseases of the brain, ear, nose, throat, and skin. Part III has two informative chapters on subjects about which there is much ignorance—the welfare of the blind and the ophthalmic side of the National Health Service.

There is no section which sums up the indications for local cortisone in the eye. Though very useful in many eye conditions, cortisone is potentially dangerous in the presence of

infection, but this is not clearly stated. Not all ophthalmologists will agree that cortisone is justified in the treatment of disciform keratitis, a virus infection of the cornea which, though usually self-limiting, has no specific treatment. Most of the coloured illustrations are good, but some could be improved by magnifying the view of the eye and eliminating the surrounding face.

Though intended for general practitioners, the book should be more widely used. Augmented by clinical teaching, it will provide almost all the medical student needs to know, and many consultants will find it useful as a basis for lectures to nurses.

The Physician-Writer's Book

Tricks of the Trade of Medical Writing. RICHARD M. HEWITT, A.M., M.D., senior consultant, section of publications, Mayo Clinic; associate professor of medical literature, Mayo Foundation, Graduate School, University of Minnesota. Philadelphia and London: W. B. Saunders. 1957. Pp. 415. 63*s*.

Guide to Medical Writing

A Practical Manual for Physicians, Dentists, Nurses, Pharmacists. HENRY A. DAVIDSON, M.D., editor, *Journal of the Medical Society of New Jersey.* New York: The Ronald Press Company. 1957. Pp. 338. $5.00.

FOR books on medical writing we are largely dependent on America. Fishbein's classic, *Medical Writing*, was followed a few years ago by the delightful work of Jordan and Shepard, *B for Medical Writing*. Our debt to America is now increased by two more works, as different as chalk and cheese, and each more comprehensive than the two earlier books.

Dr. Hewitt is a pupil of Fishbein and has spent all his life as a professional full-time editor. He is soaked in Latin, Greek, and English, and his many references include Demetrius, Horace, Pascal, Boswell, and Hazlitt; this scholarly background explains his dominant interest in English composition and style.

The book itself falls into seven parts: the whole article or book; the paragraph; the sentence; words; tables and illustrations; preparation of manuscripts; and the ethics of writing. The text is amplified and illustrated by 21 appendices, but the material in the appendices could readily have been incorporated in the text.

The author's style is discursive and conversational and suggests tape-recordings of his seminars. His approach to any topic is oblique and full of personal reminiscence, so that it is far from easy to see what he is driving at. The book has an unusually full table of contents and a good index.

Dr. Hewitt's vast experience would have made a more effective book if it had been brought into sharper focus.

Dr. Davidson—a practising psychiatrist—is a born journalist and his book a superb piece of concise exposition. He is everywhere crystal-clear and he never wastes a word, though the style is sometimes slangy. The reader is instructed in how to start and organise articles, select catchy titles, hook "reader-interest," and master the tactics of syntax. Other sections deal with the treatment of names, numbers, and nomenclature, case-histories, and the writing of summaries and conclusions. The most original chapter is *The View from Olympus*, which discloses one way in which editorials are conceived and written.

Physiologie und Pathologie des Lymphkreislaufes

Prof. ISTVÁN RUSZNYÁK, MIHÁLY FÖLDI, DR. MED., GYÖRGY SZABO, DR. MED., I Medizinische Universitäts Klinik, Budapest. Budapest: Verlag der Ungarischen Akademie der Wissenschaften. 1957. Pp. 836.

THE pathology of the lymphatic circulation is a neglected subject. Many points were elucidated by the work of Drinker and his associates, and this work was summarised in 1941 in Drinker and Yoffey's monograph. Succeeding work has been scattered in a variety of journals, but Professor Rusznyák and his colleagues have now drawn it together admirably.

After a historical introduction, the book describes in detail the anatomy and physiology of lymphatics, with particular emphasis on œdema formation. The work done since Starling's day is thoroughly reviewed, including the authors' own investigations and Eppinger's studies on capillary permeability. Attention is directed to the importance of Haitinger's fluorochrome method in the study of capillary permeability in pathological conditions and under the influence of various drugs. A few sections stained by this method are reproduced in colour-photomicrography. Finally, the authors discuss the lymphatic circulation and its pathological changes in individual organs. There are about 2000 references, some in Hungarian or Russian and not easily accessible. The paper, print, and illustrations are excellent.

Both the publishers, the Hungarian Academy of Sciences, and Professor Rusznyák and his colleagues are to be congratulated on this addition to medical literature.

Liver: Structure and Function

HANS POPPER, M.D., PH.D., professor of pathology, Northwestern University Medical School, Chicago; FENTON SCHAFFNER M.S., M.D., co-chairman, Dept. of Medicine, Woodlawn Hospital, Chicago. New York, Toronto, and London: McGraw Hill. 1957. Pp. 777. $20.00.

No doubt it is the new knowledge derived from experimental studies and the widespread use of aspiration biopsy that has led to the steady crop of books on the liver and its diseases. The combination of functional and structural investigation has now reached the stage when the two can profitably be correlated in both the healthy and the diseased organ, and this attempt by Professor Popper and Dr. Schaffner is extremely successful. They have not only achieved their primary objective of correlation, but they have also produced an excellent textbook. Its encyclopædic content and the omission of anything about treatment may make it unsuitable for the student reading for higher qualifications, but it will undoubtedly be the standard reference book of its subject for years to come. The bibliography contains 3735 references and is supplemented by an appendix, a sort of "stop-press" news bringing each chapter up to date about six months before publication—a remarkable feat. The publication and the lavish illustrations are of high quality.

The senior author, a student of Eppinger, has shared in producing a worthy successor to Eppinger's famous book. As the authors claim, it is "a complete source book on the liver in health and disease."

The Management of Abdominal Operations (2 vols. 2nd ed. London: H. K. Lewis. 1957. Pp. 1326. 160*s*.).—With one exception the contributors to Mr. Rodney Maingot's book are the same as in the first edition: its character therefore remains unaltered, though its form has been improved by substituting two volumes for the original one, whose bulk sat uneasily in the lap. Revision has been undertaken, and almost all sections are fully up to date. But it is a pity that no mention is made in the chapter on chemotherapy and antibiotics of the dangers arising from the encouragement of insensitive staphylococci, though the subject is referred to briefly under complications of the wound. The special value of erythromycin receives no more than a line under peritonitis, and pseudo-membranous enterocolitis is listed under complications of gastric operations, but is not discussed. Since the book is concerned essentially with management, operative technique could with advantage be excluded from certain chapters. For the postgraduate surgical student, this book will remain a valued guide.

The Neurohypophysis (London: Butterworth's Scientific Publications. 1957. Pp. 275. 50*s*.).—The proceedings of the symposium on this subject held by the Colston Research Society in Bristol last year have been published under the editorship of Prof. H. Heller.

Microbial Ecology (London: Cambridge University Press. 1957. Pp. 388. 32*s*. 6*d*.).—The 7th symposium of the Society for General Microbiology was held last month and microbiologists from Britain and the United States took part. The papers, which are edited by Dr. R. E. O. Williams and Dr. C. C. Spicer, chiefly discuss the relationships of micro-organisms with their inanimate environment, with each other, and with higher forms.

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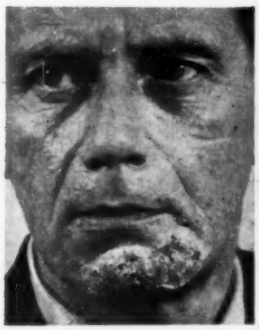

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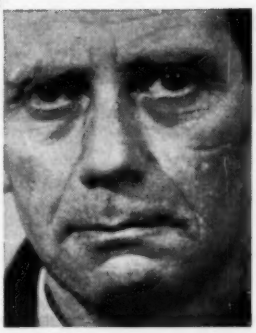

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THE LANCET

LONDON: SATURDAY, MAY 11, 1957

Relatives in Hospital

IT may puzzle a future generation of doctors that the medical students of today, though encouraged to spend many an idle minute gossiping with their patients, often qualify without having listened to a devoted wife being told that her husband will be dead before next Christmas, without having seen new hope kindled in the eyes of a sick child's mother, and without having been startled as the cause of a perplexing intestinal disorder is laid bare in the natter of a nagging wife or the bluster of a tyrannical husband. Nor are they usually taught—and many never learn to appreciate—the profound effect visitors have on sick people in hospital. Most of them take infinite pains to spare their patients physical hardship and mental anguish; but between three and four in the afternoon any well-meaning friend can talk the convalescent case of coronary thrombosis into a heart-attack, and milk-drips can beat solemn time to tales of unrelieved gloom. But if the protective isolation of a hospital should give the housewife her first chance in years to sleep undisturbed, to eat well, and to talk in complete sentences, to the proud mother regular visitors with the family news are as vital as rest, good food, and shots of the latest wonder-drug; and to the gravely ill the quiet presence of a husband or mother, just sitting close to the bed, passing a drink, or (in answer to a familiar flicker of the eyelid) adjusting a crumpled pillow, brings comfort and solace that the best nursing care can never replace. In his contribution to a well-conceived group of articles on this subject in the *University of Leeds Medical Journal*, HELLIER writes: "The psychological effect of a relative's visit will obviously depend on circumstances; and these should be carefully considered before encouraging or discouraging visitors. . . . A regular visitor who can bring a needle and cotton or a favourite bottle of eau-de-cologne gives the patient a feeling that she has access still to her possessions." [1]

Patients at either extreme of life offer a special challenge to doctors, nurses, and hospital administrators. Children require strong emotional support in an emergency; and HELLIER is in no doubt that against emotional stress "the mother is the most effective prophylactic." Like ILLINGWORTH and HOLT,[2] whose pioneering inquiry we published in 1955, he believes that the initial disturbance of daily visits soon passes off and that only such close contact can prevent "the psychological scars of prolonged hospitalisation in childhood" which he sees in many adults today. At St. James's Hospital in Leeds accommodation is provided for mothers to be admitted with their ill children—a striking contrast to venerable institutions which still allow their visitors to queue up in the rain. At the other extreme of life fear from our hostile world torments no longer; it is the long-legged shadows of the next which begin to assemble around the bed. Some elderly sick take to solitude with calm serenity—it becomes to them the audience chamber of God—but to the majority it is hell let loose on earth. Relief from their agony calls for patient inquiry from nurse, almoner, and social worker (for there is often some trivial obstacle in the way of visiting), but the ultimate responsibility for their peace of mind rests with the doctor. Only he can impress on the reluctant relatives of a dying man, that, however strained and perfunctory their visit may seem to them, it is that magical coin which he most desperately needs—just as the doctor alone can tactfully relieve a relative from the moral compulsion of sitting up night after night by the bedside of an unconscious patient in extremis.

On the mentally ill, even more than on children and the old, outside visits may have a dramatic effect. Recalling our earlier appeal for easier access to mental hospitals,[3] Professor MACCALMAN, in a posthumously published article,[4] reminds us that "we are all members of a group—the family—and, small though it is, it provides a nucleus of security for which there is no substitute." Yet, at the critical moment when the patient "finds himself suddenly, and perhaps violently, uprooted from everyday life, and cast into the confusion and indignity of a mental-hospital ward—there to wage unequal combat with the unspoken suggestion that he has done something he ought not to have done," [5] he is both spiritually and geographically isolated from this source of strength.

If scant attention is being paid to the effect of visitors on hospital patients, most doctors feel that the effect patients may have on their visitors hardly concerns them at all. Nothing can be more comforting to a child coming round from an anæsthetic (and more trouble-saving to the nursing staff) than the mother's smile; but mothers deserve a warning before being confronted with an unconscious child smeared with blood and vomit. Seriously ill patients can be so changed in appearance that relatives, seeing them thus for the first time, may be unnecessarily alarmed; and their alarm will often communicate itself to the patient. And children should not be allowed to see adults gravely ill—or even Granny's familiar face without her false teeth—except for some special reason. The difficulty of obtaining accurate information from hospitals still causes much animated correspondence in the lay press; and doctors who dismiss this as yet another unpleasant manifestation of the *Zeitgeist* should occasionally visit sick friends incognito. There is no doubt that parents are still being fed on junior nurses' garbled versions of their child's major illness; and few are the happy doctors who have not been summoned to family conclaves where worried relatives try to piece together dropped hints from sister-in-a-hurry, conversational fragments from

1. Hellier, F. F. *Univ. Leeds med. J.* 1957, **6**, 1.
2. Illingworth, R. S., Holt, K. S. *Lancet*, 1955, ii, 1257.
3. *Ibid*, 1956, i, 334.
4. MacCalman, D. R. *Univ. Leeds med. J.* 1957, **6**, 1.
5. Woodley, H. G. *Lancet*, 1956, i, 338.

patients-in-the-know, and ambiguous statements from popular health manuals. The reason for this secretiveness is neither pressure of routine work, nor delight in conspiratorial hocus-pocus, nor the callousness of youth. To interview relatives is a subtle and exacting art (far more complicated than interviewing patients) which should be taught to every medical student as assiduously as the examination of the chest. But because the young doctor has received no such education, he is oppressed by the fear that under the anxious scrutiny of relatives he will make a fool of himself. And in fact, when indignantly (for there is usually some more pressing and congenial task to hand) he faces his ordeal, his performance is thoroughly lamentable. It is difficult to decide which is worse—the cocky "just-leave-it-to-us-and-don't-you-worry" attitude of some, or the nervous diffidence of others—and hilarious stories about relatives overheard mispronouncing medical jargon cast a poor light on their learned source of origin. The losers in this cruel game are, of course, the doctors even more than the relatives. The wise clinician not only talks to the family, but also makes them talk to him; and he takes careful note of tell-tale gaps as well as of the tale they tell. All relatives when first seen are upset; and, not being under the special licence of the sick to unburden their souls without restraint, their conversation becomes a mixture of wishful thinking, morbid fantasy, and time-honoured euphemisms. "Many mothers . . . bringing children suffering from an obvious behaviour disorder are eager to tell us about the time when he fell out of the pram as an infant; and relatives of those with psychosomatic disorder descant about his physical infirmities to the exclusion of all else." [4] But misinterpretations can be as revealing as hard facts; and even the silences of the strong silent father or the meek masochistic mother can point to the need for treating the relatives as well as the patient. "This more than doubles our task, but without it all our efforts to help the patient may be in vain." [4] With predominantly hereditary or familial disorders the value of examining all members of the family is obvious; but careful inquiry into the family history may be equally important when patients are genetically predisposed to a disease but not yet affected by it; when, in fact, careful adjustment of their environment may still prevent its onset. It has recently been claimed that, not only do the children of diabetics run an increased risk of developing diabetes, but, before they do so, many show small reversible blood-vessel changes; and treatment of these might possibly prevent the diabetes. CARTER [6] believes that "this type of preventive approach will become increasingly important for many of the now common disorders."

That relatives have a legal right to see the doctor during their visit to hospital is now accepted. (HELLIER [1] mentions a case where a relative slipped and broke a leg while trying to locate a house-physician; and for this accident the hospital was held responsible.) But surely from a humane profession they have a moral right to expect more than this. We should appreciate the immense nervous strain, and often the financial burden, that hospital visiting can entail; and hospital management committees, which justly pride themselves on providing all comfort for their patients, should look after visitors with equal consideration. Their difficulties may be great—they range from deterring visitors from collecting expensive souvenirs to providing lavatories—but these must be overcome. The good name of a hospital depends today—and it will depend even more in the future—on its coöperation with the families and friends of the sick as well as on its care of patients. These twin tasks are indeed already inseparable.

6. Carter, C. O. *Univ. Leeds med. J.* 1957, **6**, 1.

Wilson's Disease

IN the past decade much has been learnt about Wilson's disease (hepatolenticular degeneration). There can now be no doubt that disordered copper metabolism is the underlying cause. Urinary excretion of copper is increased [1] and the copper content of the brain and liver is also enhanced [2]; but the serum-copper level is low.[3 4] The association of high tissue-copper levels with high urinary excretion of the metal suggested that too much copper may be absorbed from the alimentary canal; and that this is so was proved by ZIMDAHL et al.[5] who in careful balance studies showed that in a three-day period healthy subjects retained 79–140 μg. of copper, whereas patients with Wilson's disease retained 1·6–1·8 mg. Possibly this excessive retention is due to failure of some mechanism in the alimentary mucosa which normally inhibits absorption of copper. (An alternative interpretation—that copper absorbed from the alimentary canal is not excreted, as it normally is, into the bile—seems to be excluded by the finding of approximately normal levels of biliary copper.)

Like most metals copper has an affinity for proteins, the positively charged metallic ions forming a loose complex with the negatively charged parts of the protein molecule. It might be expected therefore that copper would exist in serum in such a combination; but plasma-copper has been found to exist mostly as a much more firmly bound complex. This was isolated by HOLMBERG and LAURELL,[6] who named it cæruloplasmin because of its blue colour. SCHEINBERG and GITLIN [3] found that in patients with Wilson's disease the serum level of cæruloplasmin was much lower than in health. The slight reduction in serum-copper found by these workers bore no comparison with the almost complete absence of cæruloplasmin, and it was clear that the serum must contain much copper in an abnormal form. Studies with radioactive copper led to a similar conclusion. EARL et al.[7] showed that radioactive copper (^{64}Cu) given by mouth to healthy people is at first attached to the albumin fraction of the serum-protein as separated by ammonium sulphate; and the same is true of ^{64}Cu added to serum in vitro. But samples of blood taken twenty-four hours after administration of the copper showed that this had been transferred from the albumin to the globulin fraction; and presumably in the interval the ^{64}Cu had been incorporated into the cæruloplasmin molecule.

1. Mandelbrote, B. M., Stainier, M. W., Thompson, R. H. S. Thruston, R. M. *Brain*, 1948, **71**, 212.
2. Cumings, J. N. *Ibid*, 1948, **71**, 410.
3. Scheinberg, I. H., Gitlin, D. *Science*, 1952, **116**, 484.
4. Bearn, A. G. *Amer. J. Med.* 1953, **15**, 443.
5. Zimdahl, W. T., Hyman, I., Cook, D. *Neurology*, 1953, **3**, 569.
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On the other hand, in Wilson's disease this transfer of copper from albumin to globulin does not take place: the radioactive copper remains associated with the albumin fraction. These findings accord with the observation by SCHEINBERG and GITLIN that in this disease the plasma level of cæruloplasmin is low. It seems that the low level is due to defective synthesis in the body, which leads to the presence in the serum of large amounts of copper bound to protein but not so firmly as it is in the cæruloplasmin molecule; and is presumably this copper which is deposited in the brain and liver and results in the clinical manifestations of the disease. Why the copper is deposited in the brain and particularly in the basal ganglia is uncertain, but normally basal ganglia contain a large amount of copper and possibly there is a protein there with a high affinity for the metal. PORTER and FOLCH [8] examined the form in which copper is laid down in the brain and have found notable differences between healthy subjects and patients with hepatolenticular degeneration. CHALMERS et al.[9] have now put forward the hypothesis, backed by some experimental observations, that liver-protein from patients with this disease has a greater affinity for copper than has protein from normal liver. They feel that the excessive deposition of copper may be related to this rather than to the abnormal circulating copper.

Treatment of the condition with dimercaprol (BAL) was first reported in 1951.[2,10] This drug forms a stable non-toxic complex with copper and causes it to be excreted in the urine in even larger amounts. In some cases this drug improves the clinical state—which strengthens the supposition that excessive deposition of copper is the immediate cause of the disease. Lately other methods of treatment have been used. Oral administration of potassium sulphide regularly with meals diminishes the alimentary absorption of copper by forming insoluble copper sulphide. WALSHE [11] has found that penicillamine increases the excretion of copper. Calcium disodium ethylenediamine tetra-acetate has also been used, but has the disadvantage that it must be given intravenously.

The diagnosis of Wilson's disease by chemical methods depends on demonstrating excessive copper in the urine or a low serum level of cæruloplasmin. Small amounts of copper are not easily estimated, and there is always a possibility of error from contamination of the specimen with extraneous copper. For this reason the estimation of cæruloplasmin, particularly by the simplified method of RAVIN,[12] is probably to be preferred. Serum-cæruloplasmin can be estimated indirectly by measuring the rate of oxidation of paraphenylene diamine in the presence of the serum; the rate of oxidation is proportional to the level of cæruloplasmin. From DENNY-BROWN's work it is apparent that the success of treatment with dimercaprol depends a good deal on early diagnosis. Clinically the diagnosis in the early stages may be extremely difficult or impossible; so such helpful chemical methods are highly important.

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10. Denny-Brown, D., Porter, H. *Ibid*, 1951, **245**, 917.
11. Walshe, J. M. *Lancet*, 1956, i, 25.
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Long-term Studies in Man

ATHEROMA is perhaps the most important unsolved problem in human pathology and certainly the most discussed. In the welter of observations and speculations on the relation between coronary-artery disease and dietary fat, three facts now stand out beyond dispute. First, coronary-artery disease is closely associated with a disturbance of blood-lipids and in particular with high levels of cholesterol in the serum. Secondly, in countries and communities with a high prevalence of coronary-artery disease, the susceptible population have levels of serum-cholesterol and intakes of dietary fat higher than are found in countries where the disease is less common. (In these epidemiological studies ANCEL KEYS and his colleagues at the University of Minnesota have been pioneers.) Thirdly, in people whose level of serum-cholesterol is high it can be lowered by altering the quality of the fat in the diet. The study of the effects of different dietary fats on serum-cholesterol levels which Dr. AHRENS and his colleagues present at the front of this issue confirms and amplifies earlier reports from themselves and others. The most sceptical critic cannot now dispute the fact that the quality of the dietary fat influences the levels of serum-lipids. He must be strongly impressed, too, by the evidence that the ability of the fat to lower the level of serum-cholesterol is associated with its degree of unsaturation, though, as AHRENS points out, other chemical properties of the fat have not been completely ruled out. Of course other factors besides diet—e.g., the constitutional make-up of the individual, hormonal activity, and perhaps the extent of physical activity—also determine in part the levels of serum-lipids. Nor is it satisfactorily established that patients are clinically improved, and the risk of cardiac infarction reduced, when the serum-lipids are held continuously at low levels by a dietary régime. All this obviously needs further study. Unfortunately few medical centres in the world have, as yet, the organisation necessary for experiments on man on the scale required.

Mankind owes a great debt to laboratory animals, and much help has been obtained from them in acquiring an understanding of the nature of diseases arising as a result of acute infections and dietary deficiencies. But, whereas there is much pathology in common between a guineapig and a man suffering from generalised tuberculosis, and also between a rabbit and a child blinded by keratomalacia, the animal counterparts of the chronic degenerative diseases of man either do not exist or have little relation to human disease. Hence it is important to be able to examine the progress of diseases in man under experimentally controlled conditions. AHRENS and his colleagues say that "the unique design" of their studies "was based on the belief that nutritional experiments can be carried out as precisely in man as in animals." In this belief they were justified by the fortitude of the 37 citizens of New York, who were prepared to live for periods ranging from two to forty months without eating any natural food and subsisting entirely on synthetic diets. That these people were able to do so, and for the most part appeared to improve in health on these artificial régimes, is a great tribute to the skill and sympathy of the staff at the

Rockefeller Institute and also to the administrative arrangements.

Advancement of our understanding of several important pathological processes would be much accelerated by the study of patients under similarly controlled conditions for periods to be measured in months. But although some teaching hospitals in Britain have small metabolic wards, none are provided with the staff or equipment required for studies on such a scale over so long a time. To ensure both the physical and social well-being of experimental patients and the accurate collection and analyses of data a very large staff is needed, as well as floor space for laboratories and social amenities: to care for and investigate thoroughly 5 patients, a staff of 25 to 50 persons may be necessary. But the setting up of one or more such research centres in this country would have immense practical value. Properly safeguarded, *Homo sapiens* can be a very useful laboratory animal.

Annotations

RACIAL DISCRIMINATION IN MEDICINE

THE Natal Provincial Administration, noting that the salary scales in their hospitals have always distinguished between nurses and teachers of different races, decided recently to extend this principle to the eight non-European doctors working as interns at Edendale Hospital, Pietermaritzburg. These doctors have resigned in protest.

Since 1950 in South Africa graduates in medicine have had to hold house-appointments for a year in an approved hospital before registering with the South African Medical and Dental Council. In 1950, though no Transvaal provincial hospitals would employ non-European doctors, the number of non-European medical graduates from Johannesburg was small enough for all to find posts in mission hospitals or in the British Protectorates. In July, 1951, however, three Indian graduates could not find a place; and apparently no-one was responsible for finding them one. For several months they searched in vain for appointments; and it was not until their plight had been given publicity by various student and professional bodies that arrangements were made for them in a provincial hospital serving non-Europeans. The practical difficulty that had to be overcome was that white nursing sisters in South Africa could not be expected to "take orders" from non-white interns. (The seriousness of this difficulty is emphasised by the provision of the present Nursing Bill, which imposes a fine of up to £200 on anyone allowing a white nurse to work under a non-white person.) This obstacle was circumvented in the Transvaal provincial hospital by employing non-white sisters in units where non-white interns were placed. Like all other Transvaal provincial employees, however, these interns in Transvaal hospitals were paid at a lower rate because of their race—a state of affairs accepted by the profession, no doubt because of the urgent need to enable them to serve their statutory year. At that time the Natal Provincial Administration was not prepared to give appointments to non-European interns in any of its hospitals: even the 1500-bed non-European hospital in Durban did not have non-European interns, though its present connection with the medical school for non-Europeans has obviously changed the position. Influenced probably by a serious shortage of junior doctors, it later decided to appoint non-European interns at Edendale Hospital; and these are the appointments now made vacant by resignation.

In South African society, different rates of pay for European and non-European doctors will be regarded by many as logical and consistent. It is entrenched national policy in industry and agriculture, and in other professions such as nursing and teaching (although not in university lecturing). To the South African doctor, however, it does raise a new issue, since differential rates affect not only the economic but inevitably the professional status of all his colleagues. The events of recent years are a challenge to the standing of the South African medical profession of which it is well aware. The British Medical Association's cancellation of its proposed conference in South Africa, because satisfactory arrangements could not be made for all delegates regardless of race, was a grave blow. When the South African government decided that only white donors might give blood to white recipients and that blood bottles were to be labelled accordingly, many South African doctors felt this as a slur on the scientific reputation of their country—though the Medical Council thought it could not act in this "political" issue. The recent decision to impose apartheid in all universities and medical schools is considered a threat to the maintenance of equal professional standards for all graduates. Different status and different training for non-European nurses, now to be added to the already existing lower salary scales, will also have repercussions for the medical profession. Not long ago a South African local authority advertised in the *South African Medical Journal* for 15 "European" general practitioners to attend to its employees. The local branch of the Medical Association have published their emphatic opposition to the racial discrimination implied in the advertisement and have approached the authority with a view to its revision. They recognise the duty to resist discrimination against colleagues.

At its March meeting the South African Medical and Dental Council decided after debate that non-European interns, in accepting posts at different pay-rates from European interns, did not contravene its ethical rules. The executive regarded the matter of differential rates as one of public policy in which it was inappropriate to intervene. On the other hand, many members of the profession hold that, though the rules of the South African Medical and Dental Council may not have been contravened, such discrimination does not conform with Hippocratic ethics. The professional interests of South African doctors are threatened in many ways by this and the other developments in the medical schools and the nursing profession. Consistent ethical and professional standards, scientific freedom, and a ready exchange between nations are essential to the advance of modern medicine in all countries.

NEPHRITOGENIC STREPTOCOCCI

ALTHOUGH Bright [1] observed over a hundred years ago that renal disease with albuminuria may follow scarlatina, the significance of hæmolytic streptococcal infections in the pathogenesis of acute glomerulonephritis has been slow to emerge. Nowadays it is believed that infection with group-A streptococci may result in at least two non-suppurative complications—rheumatic fever and acute nephritis—but while the link with rheumatic sequelæ is well substantiated, until recently the evidence for the link with glomerulonephritis has been patchy. Much of the earlier work establishing the streptococcal association of acute rheumatism was epidemiological, but with glomerulonephritis epidemiology reveals no discernible pattern. In patients with scarlet fever (when this disease was very common) the incidence of nephritis varied very widely,[2] both between epidemics and from year to year. Rammelkamp and his colleagues,[3] using

1. Bright, R. *Guy's Hosp. Rep.* 1836, **1**, 388.
2. Hansborg, H. *Acta med. scand.* 1925, **61**, 576.
3. Rammelkamp, C. H., Weaver, R. S., Dingle, J. H. *Trans. Ass. Amer. Phycns*, 1952, **65**, 168.

Lancefield's precipitin method of typing group-A streptococci to study the distribution of streptococcal types in nephritis, showed that among sporadic cases in Cleveland, Ohio, the majority were associated with type-12 infections, and some with type 4. This preponderance of type 12 among strains inducing acute nephritis has been confirmed by independent studies, including a small British series.[4]

Rammelkamp [5] now affirms that there is strong evidence of specifically "nephritogenic" strains of group-A streptococci; these commonly belong to type 12, to type 4, or to a new type—Red Lake—recently identified by Updyke et al.[6] in an epidemic of scarlet fever and nephritis in an Indian reservation in Minnesota. There is evidence, too, that children who have recovered from acute glomerulonephritis usually exhibit type-antibody to one of the nephritogenic types of streptococcus.[7] There is a strong contrast here with rheumatic fever, in which no particular types or strains of group-A streptococci have been incriminated as "rheumatogenic," although such evidence has been much sought. (In the Red Lake outbreak the source of the preponderant type was often in skin lesions. Does rheumatic fever ever complicate streptococcal infections unless they involve the upper respiratory tract?)

A striking point in Rammelkamp's work is that many strains of streptococci of types 12, 4, and 25 (another occasionally nephritogenic type) undergo lysis after infection with a bacteriophage not usually lytic for other serological types. It is known [8] that bacteriophage may convert avirulent diphtheria bacilli to toxigenic mutants; and possibly, as Rammelkamp suggests, a similar phenomenon determines the pathogenesis of nephritis. But it is necessary to bear in mind Maxted's work [9] on streptococcal phages, which showed that the hyaluronic acid capsule of certain mucoid strains protects against phage action; and it should be noted that Rammelkamp's type-12 strains are described as non-mucoid. Further studies on lysis of these strains will be of great interest. What has been discovered so far seems to indicate that in the causation of acute glomerulonephritis the peculiarity lies largely in the organism: in rheumatic fever it may lie in the host.

DEVELOPMENTS IN CANADA

AFTER thirty years' consideration, Canada has taken the first step towards a national health service with a hospital-care insurance plan which is to come into action early in 1959. Six out of ten provinces, containing more than half the country's population, have signed agreements with the Dominion government to set up hospital insurance systems to be financed jointly by the Dominion and provincial governments. With six provinces participating, the cost to the Dominion will be $100 million a year, a sum expected to be doubled when all ten provinces join in. The proposed plan includes standard ward care in general hospitals, with some diagnostic service and treatment, and care for the chronically ill. Benefits will be unlimited and cover universal; but treatment in tuberculosis sanatoria and mental hospitals will be excluded.

At present, 9 million people—about two-thirds of the population—have some form of pre-paid hospital insurance from a wide variety of sources. Two provinces (British Columbia and Saskatchewan) have a universal compulsory insurance system financed by premiums and sales taxes, while two others (Alberta and Newfoundland) have voluntary plans for certain areas. Five plans for pre-paid care, sponsored by hospital associations, give service benefits to participants, and many commercial insurance companies are also in the field, offering set cash indemnities against sickness and accident. But the non-governmental agencies provide only limited benefits; and, since their cover is directed mainly towards groups of employees, the rural population and the self-employed can gain protection only through the high premiums set for individuals.

Cover for medical and surgical care is even more diversified than for hospital care and much less adequate. Some provinces provide for the treatment of specific diseases, such as tuberculosis, cancer, poliomyelitis, venereal disease, and mental illness, free or on a means test, and some provide free medical care for pensioners and people receiving public assistance. On the prairies and in the maritimes, a number of municipalities have salaried community doctors, and a few industries have company doctors. Commercial companies also insure against medical costs. A million and a half people are enrolled in eight plans for prepaid medical care sponsored by doctors' associations as an alternative to State medicine. These latter plans are the most popular and give the most comprehensive benefits; but, like the plans operated by hospital associations, their cover is so far confined to groups of employees.

Since hospital expenses are usually the heaviest part of medical costs to the patient, the new hospital-care insurance plan meets the strong demand for some provision against the risks of illness—and meets it in a politically safe area. The Dominion government has firmly stated that it will not control or interfere with the hospitals. Doctors, though opposed to any State plan for complete medical care, have generally approved pre-paid hospital care where it has been tried. The introduction of a comprehensive medical service is not, of course, prevented only by resistance from professional bodies. Under Canada's federal constitution, matters of health and welfare are a provincial responsibility; and, even with the Dominion government footing half the bill, the poorer provinces could not assume the tax burden of a complete health service.

THE HOSPITAL BED

EFFICIENT use of hospital resources was never more necessary; and the means to this end were helpfully discussed by the Institute of Hospital Administrators [1] at Torquay last week. Dr. G. E. Godber, deputy chief medical officer of the Ministry of Health, began by saying that, on the medical side, we must be sure that treatment really does require the use of a bed and cannot be undertaken satisfactorily by the family doctor or in the outpatient department. Once admitted, the patient's medical needs require that his stay in the bed should be for the shortest period compatible with adequate treatment, and he should never be kept in the hospital for investigations or forms of treatment which could equally well be carried out while he is living at home. Though the doctor and nurse are concerned with doing their best for the patient actually in the bed, some account must be taken of the queue of other patients, behind his shoulder, whose need may be no less great: at the end of 1955, for every bed allocated to general surgery there were nearly four patients awaiting admission, and in gynæcology and ophthalmology there were six. Though nobody should be hustled out of the hospital bed to his own disadvantage, the waiting-list is a valid reason for taking special care that no time is lost in returning a patient to his own home if treatment can be completed there. Commenting on the fallacies of "bed occupancy" as an index of efficiency, Dr. Godber pointed out that

4. Wilmers, M. J., Cunliffe, A. C., Williams, R. E. O. *Lancet*, 1954, ii, 17.
5. Rammelkamp, C. H. *J. chron. Dis.* 1957, **5**, 28.
6. Updyke, E. L., Moore, M. S., Conroy, E. *Science*, 1953, **121**, 171.
7. Rammelkamp, C. H. *Proc. Inst. Med. Chicago*. 1953, **19**, 371.
8. Freeman, V. J. *J. Bact.* 1951, **61**, 675.
9. Maxted, W. R. *Nature, Lond.* 1952, **170**, 1020.

1. Some of the opening addresses have been printed by the institute, 75, Portland Place, W.1.

it is better for the patient and the service that a bed should be empty than it should be needlessly occupied. But there is every reason for avoiding waste of a bed even for a single day if it can be used. The interval between admissions varies between specialties, but (excluding obstetric, chronic, and mental beds) the average in 1954 was 3·72 days. Even allowing for the distorting effect of very long periods in a few specialties, this figure seems too high, and it is not falling as much as was hoped. Admitting the many potential errors of calculations from national figures, "it is a reasonable proposition that improved admission procedures might save an appreciable amount of time that is now lost."

Much improvement has, of course, been made already. Dr. Godber said that between 1949 and 1955, with a rise of only 1·2% in the number of beds, discharges (including deaths) rose by almost 25%. Part of the improvement was due to an increase of available staffed beds from 448,037 to 476,109; but there is no doubt that many hospitals have found it practicable both to shorten stay and to shorten the interval between admissions; and it is evident that "a substantial increase in work done in hospital beds can be achieved without any great increase in their number." In general, our lack is in quality and distribution rather than quantity of beds. "We are more than keeping pace with demand and we may expect to reduce the deficit steadily." It is impossible to judge future requirements accurately, because we cannot say how many days of care would be needed if all our hospitals were modern well-planned units: but it is significant that in class-I hospitals in New Zealand the treatment of acute medical and surgical conditions took a shorter time than it did in class-II hospitals, which are presumably less well equipped.

Sir Harry Platt, P.R.C.S., spoke more forcibly about the obsolescence of our hospitals, in both structure and equipment: we are trying, he said, to practise 20th-century medicine in 19th-century buildings. On the Continent, since the war, new hospitals—many with interesting features—have grown like mushrooms. There developments have been financed by local loans, philanthropy, and central government grants, but with the emphasis on city and local loans. In this country we must change the system by which hospital building is financed exclusively from central Government funds: if people want the best hospital services, they must pay for them. Urging that, in hospital design, account must be taken of changing techniques, Sir Harry mentioned new Canadian hospitals in which an acute unit—not just a few recovery beds—is attached to the operating-theatre unit. When patients return to the ward three or four days after operation they look after themselves, and the ward is designed so that they can do so.

TUBERCULIN-TESTING

To be successful, an epidemiological survey must be simple to carry out, easy to explain to the populace, and capable of reproduction not only in the same country but also in other countries at the hands of other investigators. These criteria can be fulfilled in surveys of tuberculin sensitivity by either the Mantoux or the Heaf method. Yet little is known about the tuberculin sensitivity of the population of this and other countries, even though, as tuberculosis becomes less common, tuberculin sensitivity becomes more important.

Nowadays the most widely accepted test is the intradermal Mantoux using 10 I.U. Minto [1] used this in 1954 and again in 1955 in his tuberculin surveys in Cumberland—a county with agriculture in the east and an industrial and once "depressed" area in the west. In 1953 the death-rates from tuberculosis in these areas were 0·08 and 0·28 per 1000 respectively. In that year a mass X-ray survey revealed 2 cases of active tuberculosis (0·07%) among 3015 school-children in the east, and 6 cases (0·35%) among 1692 children in the west. In 1954, 73% of the 1102 children aged 5–6 years on the school rolls in east Cumberland were tested, and 7·1% of those tested had a positive reaction; while in the industrial west 69% of the 3177 children on the roll were tested and 10·8% of these were positive reactors. In 1955 the tuberculin state of 13-year-old children was investigated. Of the 2802 children of this age 78·5% were tested, and the proportions with positive reactions were 20·1% in the east and 36% in the west.

Jarman [2] tested the tuberculin sensitivity of school-children in the Rhondda Fach in 1950–51 and again in 1953, also taking samples, for use as controls, from a neighbouring valley. The standardised percentage of positive reactors aged 5–14 years was 24·6 in the first Rhondda survey and 18·4 in the second, while the figures in the control valley were 20·2 and 18·2 respectively. There is evidence that the fall in the Rhondda is unlikely to be due to chance. Jarman also noted that the rate of tuberculin *reversion* was 13·4% in the Rhondda and only 2·2% in the control valley—suggesting that improved diagnosis and treatment in the Rhondda have decreased the chances of exposure. An associated finding was that the morbidity-rates among children were 1·4% for those tuberculin-negative and X-ray-negative in 1951, and 4·3% for those tuberculin-positive and X-ray-negative in the same year. This finding is at variance with the conclusion of most observers—that the attack-rate, judged radiologically, is higher among those previously Mantoux-negative than in those previously positive.[3]

Bush [4] has shown that the proportion of positive reactors in children in the Los Angeles area rose from 1·1% in 1952 to 2·4% in 1954, though the case-rate for all forms of tuberculosis in California fell. This rise was attributed to more home treatment, which may allow closer family contacts with the children. Furthermore, poorer patients may not be able to continue paying for drug treatment. Tuberculin-testing of school-children can be valuable not only in detecting unsuspected tuberculosis [5] but also in other ways—for example, by revealing a supply of tuberculous milk.[6]

Dr. Giannini and Dr. Sloan [7] have lately reported from Glasgow that after the age of 34 in women and of 54 in men the proportion tuberculin-negative increases with age. In 1955, a combined mass-radiography and tuberculin survey [8] was carried out in Blyth in Northumberland, and the persons radiographed were encouraged to read their own tuberculin test and report the result by post. 20,900 persons were radiographed, representing 60% of the population over the age of 5. 95% accepted the tuberculin test and 95% of these returned their cards. In all, 40 cases of active tuberculosis were found. The analysis of the tuberculin survey is not complete, but it can be expected to show areas where the proportion of people tuberculin-positive is above the average, and here the search for source cases must be concentrated.

THE next session of the General Medical Council will open on Tuesday, May 28, at 2.15 P.M., when Sir DAVID CAMPBELL, the president, will deliver an address. The Medical Disciplinary Committee will meet on Wednesday, May 29, at 2.15 P.M.

1. Minto, W. H. P. *Brit. J. Tuberc.* 1957, **51**, 60.
2. Jarman, T. F. *Brit. med. J.* 1955, ii, 1235.
3. Daniels, M., Ridehalgh, F., Springett, V. H. Tuberculosis in Young Adults. London, 1948.
4. Cited by Carson, M. J., Koch, R. *Calif. Med.* 1956, **85**, 226.
5. MacDougall, I. A., Mikhail, J. R., Tattersall, W. H. *Brit. med. J.* 1953, i, 64.
6. van Zwanenberg, D. F., Stewart, C. J., Harding, K. M., Gray, S. T. G. *Ibid*, 1956, i, 1464.
7. Giannini, D., Sloan, R. S. *Lancet*, March 9, 1957, p. 524.
8. See *Ibid*, 1955, ii, 921.

Special Articles

PUBLIC REACTION TO THE CURRENT DISPUTE BETWEEN THE MEDICAL PROFESSION AND THE GOVERNMENT *

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THIS is a preliminary account of the findings of a public-opinion survey carried out in Edinburgh and London between March 11 and March 20, 1957. The survey was designed to assess the extent of the public's information concerning the remuneration of general practitioners, the size of general practitioners' lists, and the finances of the National Health Service; to obtain judgments of the adequacy or otherwise of the income of general practitioners and on the relations between these incomes and those prevailing in other professions; to ascertain what course of action was expected as a result of the current dispute; and to elicit some more general attitudes relating to the N.H.S. and to the place of general practice within it.

The interviews were conducted in their own homes with persons whose names had been drawn systematically from the electoral registers. In Edinburgh two local-government wards were selected, and 100 names were drawn in each ward; one of the wards (Gorgie-Dalry) was known to house a predominantly working-class population, while the other (Corstorphine) was thought to have a fairly high proportion of middle-class inhabitants. In London a sample of 200 was drawn in a single ward, known to be socially heterogeneous, in the Parliamentary constituency of North Kensington. When the addresses were visited, it was found that 32 of the people on the London list and 15 of those whose names had been drawn in Edinburgh, had moved from their addresses; in each area 2 had since died. Of the remaining 349 individuals, 273 (78%) were successfully interviewed. The balance was made up of persons who refused to collaborate (7%), persons who in spite of repeated calls could not be found at home (8%), 3% who were in hospital or too ill to be interviewed, and 4% who were temporarily away from home. All interviews were carried out with a standard questionnaire, and all had been completed before the British Medical Association recommended a programme of phased withdrawal from the National Health Service.

* The London part of the inquiry was organised jointly by Mrs. M. Jefferys of the London School of Hygiene and Tropical Medicine, and by the Institute of Community Studies, Bethnal Green.

TABLE I *—SOME ASPECTS OF PUBLIC KNOWLEDGE

	School-leaving age of subjects	
	14	15+
	%	%
Earnings of general practitioners:		
Average earnings correctly estimated ..	21	24
,, ,, underestimated	54	60
,, ,, overestimated	3	2
Extent of increase claimed:		
Percentage increase correctly estimated ..	12	16
,, ,, underestimated ..	44	39
,, ,, overestimated	4	8
Size of general practitioners' lists:		
Average size correctly estimated	27	30
,, ,, underestimated	49	47
,, ,, overestimated	6	9
Basis of general practitioners' remuneration:		
Known to be based on capitation fee ..	67	81
Source of N.H.S. finances:		
Known to be mainly from taxation	21	35
Believed to be mainly from National Insurance	57	44
Relative costs of G.P. and hospital services:		
Hospital service known to be costlier ..	85	80
G.P. service believed to be costlier	5	11
N (=100%)	136	132

* 5 persons whose educational level was uncertain are omitted from this and subsequent tables.

Public Knowledge

We may begin by considering how well-informed is the general public on some relevant matters of fact. The justification for dealing first with this question lies less in its intrinsic importance—though this is not inconsiderable—than in its value in providing a background against which judgments and attitudes can be evaluated.

The principal findings under this heading are summarised in table I. In this, as in most subsequent tables, the results of the two areas have been combined, and redivided so as to show the influence of educational level on attitude, opinions, and standards of information. Only a simple dichotomy is employed, subjects who left school at the age of 14 being contrasted with those whose education lasted until the age of 15 or later.†

The general level of public information is clearly unimpressive,‡ and not very heavily influenced by education. When asked what was the average income of a general practitioner, after allowing for expenses and before deduction of income-tax, fewer than one in four of the persons interviewed gave an approximately correct answer. There was a marked tendency to underestimate the general practitioner's earnings. Well over half of all persons interviewed placed the average below £2000, and one in three thought it was less than £1500. By contrast, only 6 out of a total of 268 substantially overestimated the average, suggesting that it exceeded £2500. Those subjects who had remained at school until the age of 15 or later were less ready to plead ignorance, but were in fact no better informed than those who had left school at the minimum age.

About two in five of all persons interviewed admitted to having no knowledge of the size of the increase in remuneration which had been claimed from the Government, but in fact the extent of accurate knowledge was far smaller even than this would suggest. Another two-fifths of the sample underestimated the proposed percentage increase, and only 12% of those who had left school at 14, and 16% of the better-educated subjects, came close to an accurate answer. The increase claimed was far more commonly believed to be of the order of 10%. That the remuneration of general practitioners was based principally on a capitation fee was known to two-thirds of the less well-educated and to four-fifths of the better-educated group; about 8% believed that the general practitioner was paid on a fee-for-service basis, and another 3% imagined that he received a salary based on qualifications and experience. There was, however, little knowledge of the average size of general practitioners' lists, and again the general tendency was to underestimate rather than to exaggerate them. Here again education

† It should be noted that the two groups are not strictly comparable in respect of age composition. There are more young people in the group of subjects who left school at the age of 15 or later.

‡ A very high proportion gave an initial "don't know" response to many of the questions and this was reduced by the interviewer who invited informants to choose one of a number of alternative answers.

seemed to have little influence on the level of information. Slightly more than a quarter of all persons interviewed knew that the average size of list lay between 2000 and 3000. About half believed that the average was less than 2000, and only 7% thought that it exceeded 3000.

The illusion that National Insurance contributions pay the greater part of the cost of the N.H.S. was, as might have been expected, widespread; it was shared by more than half of those subjects who had received only minimum education, and by as many as 44% of the others. Even in this better-educated group only one person in three appreciated that the finances of the N.H.S. were principally derived from general taxation. However, few of the persons questioned were in doubt as to which was the more costly of the two major components of the health service; more than four-fifths of all subjects answered this question correctly.

Supposed Adequacy of General Practitioners' Incomes

When our subjects were asked to estimate the average earnings of general practitioners, they were also requested to say whether they thought this average income—whatever they supposed it to be—was reasonable in relation to the services at present provided, or whether it was too little or too much. As table II (i) shows, practically no-one, whatever his or her belief as to the average income of general practitioners, believed that this average was too high. The belief that the average was too low went hand in hand with a tendency to underestimate that average. Thus, of the subjects who believed the average annual income to be less than £1500, nearly 70% thought the average was inadequate. The corresponding proportion falls to 39% among those whose estimated average was between £1500 and £2000, and to 30% among those whose answers were approximately correct. At a later stage in the interview, the correct average was given by the interviewer, and the subjects whose earlier answers had been incorrect, or who had not ventured an opinion, were now asked to judge whether the actual average was reasonable. Their answers are combined, in table II (ii), with those of the persons interviewed whose estimates had been correct at the first question. We see from this table that only one person in four believed the average to be too low, while more than three in five thought it reasonable. Differences in this respect between the different educational groups were almost non-existent.

TABLE II—JUDGMENTS OF THE ADEQUACY OF GENERAL PRACTITIONERS' INCOMES

(i) Supposed Average Income

Supposed average judged to be:	Average income believed to be: Under 1000	£1000–1500	£1500–2000	£2000–2500	£2500– or more
	%	%	%	%	%
Reasonable ..	27	33	59	66	.. *
Too low	70	67	39	30	.. *
Too high ..	..	..	..	2	.. *
No opinion ..	3	..	2	2	.. *
N (=100%)	33	55	64	60	6

* Numbers too small to make an estimate.

(ii) Actual Average Income

Actual average income of general practitioners,† after expenses but before taxes are deducted, judged to be:

	%
Reasonable	62
Too low	24
Too high	6
No opinion	8
N (=100%)	268

† £2200 per annum.

(iii) Extremes of Income

—	School-leaving age of subjects: 14	15+
	%	%
Incomes of £1000 believed to be:		
Too low	79	82
Not too low	13	13
No opinion	8	5
Incomes of £3000 believed to be:		
Reasonable	60	48
Too low	9	5
Too high	22	35
No opinion	9	12
N (=100%)	136	132

TABLE III—JUDGMENTS OF COMPARATIVE EARNINGS OF GENERAL PRACTITIONERS AND OTHER OCCUPATIONS

Occupations	Percentage believing G.P.s earn more: School-leaving age of subjects 14	15+	Percentage believing G.P.s should earn more: School-leaving age of subjects 14	15+
	%	%	%	%
Grammar-school headmaster ..	66	84	71	57
Surgeon on hospital staff ..	10	8	7	7
University professor	9	28	42	33
Member of Parliament	24	44	71	64
School doctor	43	39	51	42
Bank manager	31	36	71	63
Solicitor	13	15	68	50
Minister of religion	79	87	74	76
Coalminer	70	74	78	86
N (=100%)	136	132	136	132

At this point in the interview the range of incomes as well as the average was considered. The interviewers pointed out that some doctors with a small number of patients earned only £20 per week, while others with a large number might receive as much as £60 per week; were these incomes reasonable, too low, or too high? The evidence seems to suggest that public opinion as a whole favours a narrowing of the range of incomes of general practitioners. That the doctor with a small list deserves a higher reward was agreed by four out of every five persons questioned, irrespective of their educational level. So far as the practitioner with a large list is concerned, there seems to be less general agreement, and a greater divergence between educational groups. 60% of those who had left school at the minimum age, and just under half of those with a longer educational experience, thought that the higher income was reasonable; but just under one in four of the former group, and slightly more than a third of the latter, considered it excessive.

It seems likely that a move towards reducing the variation in general practitioners' incomes, especially by improving the lot of the doctor with a relatively small number of patients, would command considerable popular support. In this context it is interesting to note that as many as 79% of all persons interviewed believed that "one general practitioner could not look after 3000 patients properly." Clearly, we cannot attach too much weight to this judgment, in view of the widespread misconception as to the number of patients the average family doctor does in fact look after. But it does at least suggest that the balance of public sympathy lies with the practitioner with the small income.

As a further step towards classifying public conceptions of the actual and the appropriate income levels of general practitioners, a short list of occupations (mainly professional) was prepared, and subjects were asked first whether they thought that general practitioners on the average earned more, less than, or the same as people

in each of these occupations, and then whether they thought they *should* earn more, less, or the same. A summary of findings is presented in table III. In general, we may say that there is a conspicuous tendency to underestimate the incomes of general practitioners in relation to those of other professional groups, coupled with a strong belief that general practitioners deserved higher rewards than most of these other groups. Both belief and judgment are influenced by the level of education. Our better-educated subjects are a good deal less inclined to believe that family doctors receive relatively low incomes, and are also less prone to believe that doctors are entitled to exceptionally high rewards as compared with members of other professions.

The only person on our list who is almost universally agreed both to receive and to merit a higher income than the general practitioner is the surgeon. The only other medical member of the list is in quite a different position. Only about 40% of our subjects believe that the school doctor earns less than the general practitioner, and slightly more of them agree that this is a desirable state of affairs. Judgments of the value of the surgeon may also be contrasted with those of the solicitor. Very few indeed of the people interviewed by us believed that general practitioners on the average received higher incomes than solicitors, but well over half of them thought that they were entitled to higher incomes. The tendency to underrate the value of the solicitor relative to the general practitioner was much less in the better-educated group, which may be presumed to have a clearer understanding of the functions and responsibilities of non-medical professions and a greater appreciation of their value. Again, only one subject in three believed that general practitioners earned more than bank managers, but twice as many believed that they should earn more; in this instance too the better-educated subjects were slightly less inclined to undervalue the non-medical profession. Two-thirds of the people in our sample who had left school at 14, and more than four-fifths of the others, recognised that general practitioners had higher incomes than grammar-school headmasters; but while seven in ten of the former group believed this to be an appropriate state of affairs, those who had had a longer educational experience were more evenly divided in their opinions. General practitioners as a group were said to receive higher incomes than university professors by only 9% of subjects with minimal formal education, and by three times as many of the others. The number of subjects in the former group who believed that the family doctor should enjoy a higher income than the professor was nearly five times as great as the number who supposed that this was in fact the case, but in the better-educated group the two percentages are very close together.

Perhaps the most striking feature in this list of occupations is the position of members of Parliament. Their standard income has been stationary for many years, and was, one would have imagined, well known to the general public. But among the people interviewed, only a quarter of those who had left school at 14, and less than half of those with a longer education to their credit, knew that general practitioners earned more than members of Parliament, while about two-thirds of both groups believed that doctors were entitled to higher incomes than M.P.s. The relative poverty of the minister of religion in comparison with the general practitioner was recognised by almost all persons interviewed, and there were few who believed that the economic positions should be reversed. Only one manual occupation—that of coalminer—was included in our list. More than 70% of persons interviewed knew that general practitioners earned more than coalminers, and an even higher proportion thought that they should earn more.

This section of our inquiry throws a useful light on the public's conceptions of the relative income-levels of general practitioners and members of some other professions. These conceptions are often erroneous, and consistently underestimate the doctor's relative remuneration. An analysis of public judgments of desirable relative income-levels shows clearly that an extremely high value is placed on the general practitioner. We may recall here that all experimental studies of the prestige ranking of occupations agree in finding that the medical profession is among those accorded the highest degree of prestige. However, in this study the tendency to place general practitioners far ahead of other professions is a good deal less evident in the better-educated subjects.

The Expected Outcome of the Dispute

The high esteem in which the public holds its general practitioners is implicit not only in the economic value placed on their services relative to those of other professions but also in the expressed expectations of their behaviour in relation to the dispute over remuneration. When questioned as to the most likely outcome of the dispute, our subjects most frequently expressed the opinion that the Government would relent and meet the doctors' claim; this view was held by 42% of the sample, irrespective of level of education. But among those who thought this outcome unlikely, the view was not conversely held that the general practitioners would withdraw from the N.H.S. if the Government remained adamant. This belief was restricted to about one in nine of all persons questioned; and for every person subscribing to this view there were three who thought it more likely that the general practitioners would not carry out their threat to withdraw from the service.

TABLE IV—JUDGMENTS OF THE PROBABLE OUTCOME OF THE CURRENT DISPUTE

—	School-leaving age of subjects	
	14	15+
	%	%
Expected outcome of current dispute:		
Government will relent	42	42
G.P.s will withdraw	11	12
G.P.s will not withdraw	37	35
No opinion	10	11
Expected behaviour of G.P.s in event of withdrawal:		
Not see any patients	1	1
See only seriously ill	11	14
See all patients, but charge	37	25
See all patients, but charge only some	37	43
See all patients without charge	7	5
No opinion	7	12
N (= 100%)	136	132

We went on to ask our subjects what course of action they thought that doctors would be likely to follow if they did in fact decide to withdraw, and listed a number of possibilities. It is a striking comment on the public conception of the doctor's rôle that of 268 people questioned, only 2 thought that in the event of a withdrawal general practitioners would refuse to see any patients. About one in eight thought that only patients who were seriously ill would be seen, but more than three-quarters of our subjects believed that practitioners would continue to see all patients. These were divided, however, as to whether or not a charge would be made. A small proportion—about 6%—thought that a free service would be provided, but the remainder believed that general practitioners would charge some fee to their patients. The most common belief was that they would "charge only those who could afford it." In the better-educated group of subjects, this view was more widely

held than the alternative expectation that all patients would be expected to pay a fee; among those who had left school at the age of 14, the two views were held with equal frequency.

If a fee was to be charged for each consultation, how much was it likely to be? In respect of both surgery and home consultations there was a considerable difference of opinion between the two social groups, but it was the less well-educated subjects, with their more modest estimations, who proved the more accurate prophets. In this group, the most common estimates were 5*s.* for a surgery consultation, and 7*s.* 6*d.* for a home visit, although at least a fifth underestimated both charges, while 15% expected that a surgery attendance would cost 10*s.* or more and as many as a quarter that the fee for a home visit would fall into this bracket. In the group of subjects who had remained at school at least until the age of 15, 36% expected a surgery consultation to cost in the neighbourhood of 10*s.*, while only 30%, compared with half of the less well-educated group, thought the fee was likely to be 5*s.* or less. Again, 45% of the better-educated group expected that the charge for a home visit would be 10*s.* or more, and two-thirds of these thought the fee was likely to be at least 15*s.*

So far as statements of intention provide a reliable guide, the imposition of a consultation fee seems likely to reduce the volume of the general practitioner's work, though not perhaps as heavily as some would suppose. About a quarter of the less educated—and on the whole less well-paid—subjects expected that if fees were introduced they would consult their doctors less frequently; this was also the belief of only one in eight of the better-educated subjects, in spite of the fact that they expected a higher scale of fees. Another rather revealing finding of this section of our inquiry is that about 70% of our persons questioned did not believe that the introduction of fees would affect the quality of general practitioners' work. The view that under such a system the general practitioner would take more time and trouble with his patients was held by only 27% of our subjects. This view was slightly more commonly found among those with only minimum education, but even in this group it appears with less than half the frequency of the opposite view. In general, the public is confident that the dispute with the Government will not affect the availability of general practitioners' services, and believes that the quality of this work does not depend upon the basis of remuneration.

TABLE V—JUDGMENTS OF THE PROBABLE CONSEQUENCES OF WITHDRAWAL

	School-leaving age of subjects	
	14	15+
	%	%
Expected fee for surgery consultations:		
Under 5*s.*	21	10
5*s.* to 6*s.*	28	20
6*s.* to 8*s.*	18	21
8*s.* and over	21	36
No opinion	12	13
Expected fee for home consultations:		
Under 6*s.*	20	10
6*s.* to 8*s.*	28	21
8*s.* to 10*s.*	13	9
10*s.* to 15*s.*	16	15
15*s.* and over	10	30
No opinion	13	15
Expected effect of payment on use of G.P.s' services:		
Will use less frequently	27	13
Will not use less frequently	68	83
No opinion	5	4
Expected effect of payment on quality of service:		
G.P.s will take more time and trouble	31	23
G.P.s will take same time and trouble	65	72
No opinion	4	5
N (= 100%)	136	132

TABLE VI—SOME VIEWS ON THE NATIONAL HEALTH SERVICE

	School-leaving age of subjects	
	14	15+
	%	%
Effect of N.H.S. on quality of medical care:		
Has improved	20	10
Has deteriorated	16	18
Has not changed	51	49
No opinion	13	23
Most valuable part of N.H.S.:		
Access to G.P.s without charge	24	27
Access to hospitals without charge	59	65
Equal value	10	3
No opinion	7	5
Comparison of G.P. and hospital outpatients:		
Hospital preferred	24	18
G.P. preferred	69	71
No opinion	7	11
Desire for N.H.S. to continue:		
Want N.H.S. to continue	81	79
Would prefer to pay for treatment	15	19
No opinion	4	2
N (= 100%)	136	132

Some Views on the National Health Service

It is clear that there are no widespread public beliefs concerning the relation between the quality of medical care and the nature of its administrative and financial context. This is indicated not only by the common view that a fee-paying system would not improve the quality of general practice, but also by retrospective judgments of the effect of the N.H.S. on medical care. Half of all persons interviewed believed that there had been no significant change, while the remainder were more or less evenly divided between those who thought there had been an improvement, those who believed there had been a deterioration, and those who had no opinion. It is perhaps significant that among those members of the sample who were less well educated—and on the average less well placed socially and economically—the view that the quality of medical care had improved since the introduction of the N.H.S. was twice as common as in the other half of the sample. The higher proportion of "no opinions" among the better-educated subjects reflects the greater number of young people in this group who were not in a position to make any comparison.

Asked which was the more valuable part of the N.H.S.—the fact that all members of the community now had access to the services of a general practitioner without charge, or that everyone was entitled to free hospital treatment—a substantial majority cast its vote for the hospital. This latter view was held by three-fifths of the persons interviewed, as compared with about a quarter who believed that access to general practitioners, unrestricted by economic considerations, was the more valuable. The question was framed in economic terms, and most of the replies were prompted by a consideration of the probable cost of hospital treatment. But this should not be taken to mean that the hospital is in some sense preferred to the general practitioner. Our subjects were asked whether, if they were to have a course of treatment which could be given either by their own general practitioner or at a hospital outpatient department, they would prefer one or the other. In this context about 70% expressed a preference for their general practitioner, more than three times as many as preferred the hospital. This former preference was sometimes explained in terms of

convenience and proximity, and sometimes in terms of specific objections to the hospital, but far and away the commonest reason for preferring the general practitioner was that he had a personal knowledge of the patient and gave a closer personal attention to his needs; this was often contrasted with the anonymous and impersonal nature of the hospital situation.

Finally, we asked our subjects whether they wanted the National Health Service to continue as at present, or whether they would prefer to pay for their own medical care. Four-fifths of the people interviewed, irrespective of social level, wanted to see the service continue.

Summary

A brief account is presented of the results of 268 interviews with members of the general public on the subject of the remuneration of general practitioners and the current dispute between them and the Government. The names of the sample were drawn from electoral registers in Edinburgh and London, districts being selected so as to yield a final sample with a higher representation of middle-class groups than might be expected in a random sample of either city.

The level of public knowledge concerning some of the basic facts relevant to the dispute is unimpressive, and the better-educated members of the sample are not very much better informed. The errors are not random, however. The average earnings of general practitioners, the magnitude of the increase claimed by the medical profession, and the average size of the general practitioners' lists are consistently underestimated. The National Health Service is widely believed to be financed mainly from National Insurance contributions.

The average income-level of general practitioners is thought to be adequate by more than 60% of the sample, and to be too low by about a quarter. The incomes of doctors with small lists are almost unanimously agreed to be too low.

A comparison of the incomes of general practitioners with those prevailing in other professions shows a tendency for doctors' earnings to be underestimated relative to those of other groups and for their comparative economic worth to be very highly rated. Both these judgments were appreciably less common in the better-educated subjects.

Few thought it likely that general practitioners would withdraw from the National Health Service, and it was widely expected that one or the other side would relent. Opinion as to the most likely consequences of withdrawal was divided, but a large majority agreed that doctors would continue to see all their patients, and charge fees to either all or some of them. The better-educated members of the sample expected a higher scale of fees than did the other subjects, who were in fact more often accurate in their predictions. A substantial majority agreed that the introduction of fees would affect neither their own use of the general practitioner's services, nor the quality of those services.

There was no consensus of opinion as to the effect of the National Health Service on the quality of the medical services, about half our subjects supposing that there had been no significant change. The hospital service was considered, on economic grounds, to be the most valuable part of the service, but most people interviewed would prefer to be treated by their general practitioner rather than at hospitals. An overwhelming majority preferred a continuation of the National Health Service to a fee-paying system.

Our thanks are due to the Institute of Community Studies and Mrs. M. Jefferys for their organisation of the London interviews, and to Mrs. Jefferys and Dr. Cecil Gordon for many valuable comments and suggestions.

CLINICAL RESEARCH

THE Ministry of Health has issued a memorandum [1] describing arrangements for coördinating and financing clinical research at hospitals in the National Health Service.

The Minister hopes that hospital authorities will do all that lies in their power to foster clinical research in their hospitals. But these authorities have research powers only under section 16 (2) of the National Health Service Act, 1946; and they have no power to assist by grants or otherwise any persons or body to carry out research which is not "conducted" by the board or committee.

"The research can be carried out by the Board or Committee alone, acting through their own officers, whether regular hospital staff or specially employed, or in conjunction with another body. The circumstances must be such that it can reasonably be said that the Board or Committee, alone or in conjunction with someone else, has promoted or sponsored the research project and has general control over its character and the carrying out of it. While, therefore, there are ample opportunities for Boards and Committees to combine with other bodies in research work, they cannot make grants to bodies in respect of research conducted solely by those bodies."

The Minister does not intend by his recommendations to limit the conduct of research by boards and committees at the cost of their non-Exchequer funds; but, having regard to the need for coördinated development, the hospital authority or the appropriate research committee should not hesitate to seek advice from the Clinical Research Board about schemes proposed to be financed from non-Exchequer funds.

CENTRALLY ORGANISED RESEARCH

One function of the Clinical Research Board is to help the Medical Research Council in organising major clinical research financed from Exchequer funds and to recommend to the Council any clinical research units—existing or proposed—for which the Council should be responsible. "Major research," says the memorandum, may be broadly defined from the white-paper [2] which led to the setting up of the Clinical Research Board. This said that hospital authorities should be debarred from paying salaries of whole-time research-workers above the grade of senior registrar, and a limit of £1000 annually should be placed on individual grants for assistance and expenses.

Following a review by the Clinical Research Board, major schemes that were being conducted by hospital authorities are being transferred to the Medical Research Council. "It is particularly requested," says the memorandum, "that all proposals for new major schemes to be financed from Exchequer funds should be referred to the Clinical Research Board and that no new commitments should be entered into in this field without prior consultation with that body."

When it is decided to establish new clinical research units at hospitals, it is for the M.R.C., advised by the Clinical Research Board, to make the necessary arrangements with the hospital authorities, including arrangements for consultation with the board or committee on the appointment of members of the unit. But "it does not follow that all major research schemes would be initiated by the central organisation. Many schemes start from proposals made by an individual clinician who may put proposals to a Hospital Board or Committee for submission to the Clinical Research Board or may apply direct to that Board."

Hospital authorities will be responsible for providing clinical facilities for the units of the central research

1. H.M.(57)36.
2. Clinical Research in Relation to the National Health Service. H.M. Stationery Office, 1953. See *Lancet*, 1953, ii, 123, 133.

organisation. This will entail honorary contracts for those members of the research units who must have access to patients, and it may sometimes require strengthening of the *hospital* clinical staff. Where a board or committee considers that extra clinical appointments are necessary to cope with the additional hospital work imposed by research requirements and, for example, where a highly specialised type of treatment attracts more patients to the hospital, the hospital authority will no doubt consult the M.R.C. and where necessary make proposals to the Minister for an increase in establishment. In small clinical research units the director alone will normally be eligible for the status of honorary consultant; but exceptionally a senior assistant may also qualify for this status, and in large units one or more of the senior workers may also qualify. The grading of all honorary appointments should be decided in agreement with the M.R.C. A research-worker with the status of honorary consultant will be eligible for a distinction award.

LOCALLY ORGANISED RESEARCH

In conducting locally organised research, hospital authorities should pay special regard to the recommendations in the 1953 white-paper that each regional board and each board of governors should set up a research committee, after consultation with the associated university or medical school, to advise on the spending of money from any source which the board has available for research, and that, where convenient, a regional board and a board of governors might set up a joint committee to serve them both. Management committees which wish to undertake research, however financed, should put forward proposals to the regional board for consideration.

Hospital boards are to receive from the Exchequer a specific annual allocation for locally organised research. To enable the Minister to decide on an appropriate allocation for 1958–59 and subsequent years, boards are to submit annual reports on locally organised research undertaken at the expense of Exchequer funds. These reports will be the subject of consultation with the Clinical Research Board, so that, in agreement with that body, the Minister may from time to time (generally at five-year intervals) reassess the annual allocations to ensure that they are directed to the hospitals where "the right men and facilities are available." In their reports boards should include information about research conducted by them from non-Exchequer funds in order to give a complete picture of the work in progress.

Although a board should not find it necessary to employ clinicians above the level of senior registrar for the sole or primary purpose of research, there is no objection to its arranging for a consultant, S.H.M.O., or S.H.D.O. to undertake research which is incidental to his clinical employment. Where such a doctor or dentist is employed part-time on his routine work, he should be remunerated for research by a lump-sum payment, renewed if necessary at intervals.

RESEARCH FROM NON-EXCHEQUER FUNDS

The Ministry suggests that research paid for from non-Exchequer funds might be subjected to the following broad considerations which apply to research paid for by the Exchequer: (1) advice from a joint research committee set up in agreement with a university or medical school; (2) an approved programme on broad lines in cases where lump-sum grants are to be paid to research-workers; (3) periodical progress reports to the body or bodies financing the research; and (4) inclusion of information about such research in reports to the Minister. These suggestions are "not intended in any way as a measure of limitation or supervision of the powers of Boards and Committees to use non-Exchequer funds for research in accordance with the provisions of Section 16 (2) of the National Health Service Act."

OTHER ARRANGEMENTS

A part-time consultant, S.H.M.O., or S.H.D.O. wishing to carry out research in his own time may, instead of seeking to make arrangements with his board, apply direct to the M.R.C. for financial help or for a part-time appointment on the Council's staff.

Any suitably qualified person in the hospital service may apply to the M.R.C. for a grant to cover the expenses or technical assistance required for a research project.

FALLOUT FROM BOMB TESTS

IN a paper to the American Physical Society on April 26, Dr. WILLARD F. LIBBY, commissioner of the United States Atomic Energy Commission, discussed in detail the present sum of knowledge about radioactive fallout and its effects. From his assessment of the data so far collected, Dr. Libby concluded that the risk from nuclear testing at the present rate was small.

He said that the present body burden of strontium 90 in new bone in the United States from atomic tests corresponded to the increased dosage to the bones from cosmic rays which would result from an increase of some 400 feet in altitude, and the present vital statistics showed no observable effect on the occurrence of bone cancer or leukæmia of much larger changes in altitude. The tolerance figure of 100 "sunshine" units (100 micromicrocuries per g. of body calcium) that was now recommended was about two hundred times the present level for new bone in the United States, and it would not be exceeded by fallout from weapon tests in any foreseeable circumstances.

The effect of locality was important, particularly the effect of calcium deficiency in the soils. Careful consideration of this question indicated that there would be very few individuals with a strontium-90 content which was strictly inversely proportional to the available calcium concentration of the soil in their region. The explanation was that food-distribution systems automatically averaged over a wide area and people assimilated their calcium slowly. Most people drank milk and ate cheese and other calcium-bearing foods from a rather wide area, and this effect reduced by an estimated factor of ten the potential effect of calcium deficiency in the local soils.

Laboratory experiments suggested that the human body concentration of strontium 90 at equilibrium would be between 13 and 30 times less than that in the top soil. The present data indicated that the higher figure was closer to the truth, and a conservative estimate for this ratio would be 20. Therefore, the present burden of 50 sunshine units in the top soil of the United States may eventually lead to as much as 2·5 sunshine units in the human bones, but more probably it would lead to about 1·7.

The strontium 90 still in the stratosphere would fall out, Dr. Libby expected, at a rate which just about compensated for the decay of the material already deposited, so that no great additional increase from this source was to be expected from weapons fired in the past. If the testing continued at about the same rate as it has averaged over the past five years, then an equilibrium rate of fallout would be reached after an infinite time, and that rate would be 8 times the present one. In other words, in the United States something between 5 and 20 sunshine units would be the equilibrium concentration of human bones if testing continued indefinitely at the average rate of the past five years. This level would be approached only after a few decades. After 28 years the level would be half of this equilibrium value, and in the year 2008 three-fourths of the equilibrium figures would have been reached. Thus, somewhere

between 4 and 15 sunshine units in human bones in the United States might result from the present type of testing being continued for the next fifty years.

In those parts of the world where the soil was low in calcium, this level might increase by as much as five times. At the present rate of testing it might indeed approach the figure of 100 sunshine units, the tolerance limit for large populations, at the beginning of the 21st century for these certain limited regions in the world. But, Dr. Libby added, the observed conditions in these regions could be relieved by fertilisation of the soil with calcium, either calcium nitrate or lime being used.

Conferences

DECISIONS DEFERRED

Special Representative Meeting of B.M.A.

IN its decisions about what course the remuneration dispute should take, the special representative meeting of the British Medical Association on May 1 was not as decisive as expected. New developments were put before it, and, though some representatives were doubtful whether the situation was thereby changed, the meeting decided to defer a decision on the plan for progressive withdrawal of general practitioners from the National Health Service; and it also agreed to postpone the question of evidence or no evidence to the Royal Commission until the next representative meeting.

Dr. SOLOMON WAND, chairman of the council of the B.M.A., reviewing the events that had led to the present position, said that the profession's claim had been met by the appointment of a Royal Commission and two acts of dictation—the 5% and 10% interim awards. An honourable profession had been treated with contempt and driven into a defensive action thoroughly distasteful to every one of them; but that action had been justified.

NEW DEVELOPMENTS

In recent weeks Dr. Wand had had talks with the Minister of Health and with the chairman of the Royal Commission, Sir Harry Pilkington, in an attempt to find a solution. One outcome of these discussions was a letter dated April 26 from Mr. Vosper to Dr. Wand, and this letter, it seemed, was one of the main reasons why the B.M.A. council withdrew its original recommendation to the meeting and substituted one which advised deferment of decisions on the Royal Commission and on withdrawal. This letter, read as follows:

Dear Dr. Wand,

I was glad of the opportunity of a long talk with you yesterday and I hope you feel—as I do—that it is that kind of informal and personal discussion which does most to clear away misunderstandings.

First, let me confirm what I said to you when I assured you that, following the report of the Royal Commission, there will be full consultation with the profession before implementation of any of its findings and that such consultation could of course include any matters relevant to the report or the present dispute.

Second, you seemed to fear some inconsistency between the terms of reference of the Commission and the public statements issued by its Chairman. I can certainly reassure you here too. It is normal that the interpretation of the terms of reference of a Royal Commission should be a matter for its Chairman and the Commission, and you can certainly regard the public statements which have been issued as having full validity.

Finally, I have thought—as you asked—about the position of the public health medical officers. I cannot add anything of substance to what I said in my letter of 17th April on this, but let me repeat that I am sure that any settlement for others, following the Commission's report, could not fail to be taken into account in considering the position of these officers and any claim through the normal machinery would of necessity be considered in the light of the report and of any settlement subsequent to it.

I do hope that these remarks, and our talk yesterday, will help to rid us of unnecessary apprehensions.

Yours sincerely,
DENNIS VOSPER.

Another development which had influenced the situation was an additional statement from Sir Harry Pilkington:

"That part of the Royal Commission's task that consists of considering what should be the proper current levels of remuneration of doctors and dentists will include hearing submissions from those professions as to the remuneration which they are now claiming."

At the same time the chairman had made it plain that the Commission did not and would not regard itself as an arbitrating or adjudicating body. He had also said that if it became unlikely that a report could be published by Easter, 1958, he would so inform the Government and other interested parties.

Discussing these events, Dr. Wand said that, despite the facts that the claim had not been met and that Spens was in the melting-pot of the Royal Commission, the gains were not inconsiderable. The terms of reference had been broadened (in a way that was probably unprecedented); a time-limit had been set for the report; the validity of the chairman's statements had been confirmed; full consultation had been promised before implementation of the Commission's findings; and the Government had made interim awards.

The present issue, to Dr. Wand's mind, was "give evidence or withdraw." A third alternative—to do nothing—was not, he thought, in the minds of most of the profession. Whatever decision the meeting took, the struggle was not yet over and the need for closing the ranks of the profession was as great, or greater, than before.

ROYAL COMMISSION

The council put before representatives the following recommendation:

That in the opinion of this meeting circumstances have so changed that the position has altered since the council issued its recommendation to the representative body not to give evidence to the Royal Commission, but, realising that divisions and the profession generally have not had an opportunity of considering the statements by the chairman of the Royal Commission or the letter (April 26, 1957) from the Minister of Health to the chairman of council, this special representative meeting defers a decision on the question of giving evidence to the Royal Commission until the next meeting of the representative body.

But whether "circumstances have so changed" proved a point for much argument, and a move to delete any mention of change from the recommendation was widely supported, most forcibly perhaps by Dr. B. BURNS (Sheffield). Conditions were not altered, he declared, by "a form of words." "Spens to be the basis of general-practitioner remuneration": that had been a form of words. "Negotiations on terms of service": that had been a form of words. And forms of words had lured the profession into a "paradise" in which they were the doormats of the Welfare State. If doctors coöperated with the Royal Commission they would have discussed an alternative to Spens—and that was where the politicians wanted to get them. Dr. O. C. CARTER (Bournemouth) thought that one phased withdrawal was being replaced by another—withdrawal of the profession's resistance. If doctors gave in now, they could never in the future resist unilateral action by the Government. Dr. F. S. RICKARDS (Lancaster) spoke of 5% and 10% gobstoppers to keep the profession quiet. Doctors were proving tough and the

Government was beginning to respect them for it. Dr. H. GUY DAIN (Birmingham), however, was sure that things *had* changed: the Royal Commission amounted to effective arbitration, he declared—but amid cries of dissent. The move to modify the council's recommendation was defeated by 163 to 199.

An amendment frankly in favour of coöperation with the Commission was then debated. Dr. A. H. HALL (Brighton), president of the B.M.A., said that the efforts of Dr. Wand and others had narrowed the gap in the dispute and he hoped that it could be narrowed still further—but not, he was sure, without the aid of public opinion, which should not be ignored in the meeting's decisions.

Dr. TALBOT ROGERS (Bromley) confessed that he had had serious doubts about the Royal Commission because of the probable delay in the appearance of its findings and because of the difficulty of deploying the profession's arguments before it. But these doubts had been completely resolved. The doctors had got to give evidence some time and Dr. Talbot Rogers hoped they would give it soon. Dr. A. B. DAVIES (Walsall and Lichfield), who succeeded Dr. Talbot Rogers as chairman of the General Medical Services Committee, said it was highly desirable that the meeting's decision should accord with that of the Special Conference of Local Medical Committees held on the previous day [1] (the conference had decided to defer until June a decision on the Royal Commission and on withdrawal).

Prof. H. W. ROGERS (Belfast) said his division had instructed him to vote against coöperation, but his own feeling was that to give evidence would provide doctors with a much better opportunity of having their claim heard. He thought it would be selfish, however, for some people who, like himself, were already getting an adequate salary, to claim a penny more. Doctors should raise their eyes from the mire and bitterness and try to help the country as a whole.

Mr. T. HOLMES SELLORS, chairman of the Central Consultants and Specialists Committee, said his committee had reversed a previous decision against coöperation; and the Joint Consultants and Specialists Committee had asked its constituent bodies to prepare evidence.

Several speakers were concerned at the damage coöperation with the Royal Commission might do to the public-health doctors. Dr. H. D. CHALKE (London) recalled a unanimous decision, at the last representative meeting, to "stick together." Now the public-health doctors were in danger of being thrown to the wolves.

Finally, the meeting decided to accept the council's recommendation without reservation or amendment.

WITHDRAWAL

Moving the council's second recommendation—to defer a decision on withdrawal—Dr. WAND emphasised that a date on which a decision *would* be taken had been deliberately omitted from the wording of the recommendation. It was a strong resolution: a date could easily be determined after consultations—or the breakdown of consultations—when the Royal Commission had reported. Many amendments concerned with withdrawal on the original agenda were not discussed; but it was agreed to ask the Central Consultants and Specialists Committee "to take active steps towards a special levy in proportionate amount to help in the present remuneration crisis." And the B.M.A. council was asked to use all its efforts to increase the Defence Trusts. If any of the representatives had a mind to call for an immediate decision to withdraw, they kept it to themselves; and the meeting quickly approved the council's recommendation.

1. See *Lancet*, May 4, 1957, p. 927.

A LEGAL FIGHT?

Though the fire seemed to have gone out of the meeting, Dr. J. A. GORSKY (Westminster) struck quite a spark with his robust plea for the institution of legal proceedings to establish whether the Spens reports constituted a legally implied contract. The surrender of rights by doctors when they entered the National Health Service must, he claimed, have some significance in law, and he thought that the Spens report for the general practitioner constituted a legally valid contract. The profession should ask the High Court for a declaratory judgment to that effect.

Dr. W. N. LEAK (Mid-Cheshire) read to the meeting the much-quoted paragraph 179 from the Ministry of Health *Handbook for General Medical Practitioners*. This paragraph, according to Dr. Gorsky, was admissible in a court of law.

"The Central Pool is now calculated on the basis of the estimated net remuneration appropriate for general practitioners in 1939 (as recommended by the Spens Committee in 1946) together with a betterment factor taking account of changes in the value of money since that time. This amount is adjusted to take account of changes in the number of general practitioners participating in the Service, their estimated remuneration from other sources, and the superannuation contributions made by the Exchequer."

Dr. WAND said that Dr. Gorsky's points had been in the minds of the council in recent weeks. Eminent legal opinion had been against going to court; but if another counsel were to be consulted and if he said that there was even a small reasonable chance of success, then it might be the thing to do. If legal advice was against going to court, it would be foolish to do so. The meeting was keen to see the prospects of legal action examined further, and Dr. Gorsky's plan was referred to the council.

Public Health

Adolescents

AT the Royal Society of Health congress, held at Folkestone on April 30 to May 3, Mr. W. Emrys Davies, PH.D., described how, with the forthright spirit of our times, he had challenged his teen-age pupils to uncover anonymously the pattern of their private lives, and with the trust and frankness of youth they had done so. How far the children of a comprehensive school on a large Manchester housing estate are typical of youngsters in the rest of Britain is unknown, but there seems no reason to think that Wythenshawe's are any better or any worse than their contemporaries elsewhere. Indeed it is popularly believed that children in the south of England reach social maturation and sophistication earlier than their northern brothers and sisters. Whether that is so or not, Dr. Davies's findings at least point to the broad trends in our social progress, and they are not without medical significance if we can bring ourselves to face realities.

The home background of the youngsters was mainly in social classes III and IV, 82% of the fathers being skilled or partly skilled; and the age-groups questioned were the $13\frac{1}{2}$–$14\frac{1}{2}$ or the $14\frac{1}{2}$–$15\frac{1}{2}$ cohorts. Most groups contained about 190 pupils, but some selective inquiries were much smaller. On that account many of the results should perhaps be viewed with reserve.

Dr. Davies asked his $13\frac{1}{2}$–$14\frac{1}{2}$-year-olds how they spent their spare time, and what were their major interests outside school. Physical activity in one form or another still held the interest of 60%; the other 40% had already acquired the more sedentary pursuits of British adult life today. Television and cinemas attracted both sexes fairly equally, but while the rest of the girls were starting to look for boy-friends, or occasionally reading, their male contemporaries were consoling themselves by making things with their hands. Reading anything more than comics featured little in their boyhood lives. It was another year before the boys became

more girl-conscious. At 14½-15½ years of age, 60% of boys and girls chose either companionship of the opposite sex or mixed parties.

It was found that a third of the 13½–14½ age-group had nine or less hours' sleep, and Dr. Davies suggested that this was too short a time for growing bodies and active minds. Whether a child comes to terms with sleep requirements is the parents' responsibility, but it is the schoolmaster who gets the backwash. Early to bed was never a popular cry, and perhaps less so nowadays when the hypnotic television screen stirs up sex and violence until nearly 11 P.M.

There is evidence of early recourse to sedatives. 5% of the 13½–14½-year-old group admitted taking sedative drugs regularly, and another 36% occasionally. If that is what happens with the odd bottle of pills in the bathroom cupboard, what will happen when the flood tide of tranquillisers crosses the Atlantic? If smoking can be regarded as a sedative, and not merely a display of teen-age bravado, nearly half of the boys and a fifth of the girls in the 14½–15½ group had acquired a taste for smoking, and indeed that taste might already have developed into a habit. So much for the progress of the campaign against lung cancer. Stimulation with alcohol had already started in the same age-group. Of a sample 33 boys and 32 girls, 41% seldom had a drink, 32% admitted occasional indulgence, 15% drank regularly, and 5% did so both regularly and frequently.

Answers on personal hygiene were illuminating. 65% of the youngsters bathed only once a week. Hand-washing after toilet was practised always by 34%, usually by 55%, and seldom by 11%. Teeth-cleaning was disappointing: 39% brushed their teeth either occasionally or never, 35% did so once a day, and only 25% observed did so night and morning; 3% of the girls did so more than twice a day. Sharing hair-combs was very prevalent in both sexes, but communal life no doubt encourages the practice of borrowing items of personal toilet.

The answers to these questions may suggest fresh lines of approach. We must recognise the earlier social maturation of our teenagers and realise that it is developing unevenly. If heterosexual interests are being aroused earlier than in our own generation it is no use blinding ourselves to the fact. Surely there is scope to play on the vanities of awakening consciousness to get across the basic points of personal hygiene and bodily health; this is no more than is done for the adult population by the advertisers of cosmetics, deodorants, drugs, and fancy foods. If grown-ups are most easily taught through the medium of strip-cartoons, eye-catching posters, slogans, and television, why should children be fed with less exciting fare? We are still a long way behind commercial practice with our market research.

It would be equally unrealistic to assume that youngsters know all the answers. Dr. Davies proved that they do not. Outline anatomy of the human body was only hazily understood by most of the 14½–15½ age-group, and knowledge of basic physiology was even scantier. In the 14½–15½ age-group 75% of the boys and 94% of the girls registered a strong desire to learn more about the development and functioning of the human body. No-one can blame them for their ignorance of this subject, and by their answers they threw the challenge squarely back to us.

Scotland in 1956

Provisional statistics for last year have been issued by the Registrar-General for Scotland.[1] The birth-rate was 18·5 per 1000 population, which was 0·5 above the rate for 1955. The stillbirth-rate was 24 per 1000 live and still births—1 less than that for 1955. The death-rate (12·0 per 1000 population) was the same as that for 1955. The infant-mortality rate was 29 per 1000 live births, which was the lowest ever recorded; and the neonatal-death rate was 19 per 1000—1 less than in 1955. The death-rate from tuberculosis was 16 (respiratory 14, non-respiratory 2) per 100,000 population.

1. Quarterly return of the Registrar-General, Scotland, for the quarter ended Dec. 21, 1956; also preliminary return for 1956. H.M. Stationery Office. Pp. 40. 2s. 6d.

A Primer in Public Health

Dr. A. R. Southwood, director-general of public health in South Australia, has written a booklet[1] for the guidance of newly appointed medical officers of health. It is in simple, at times breezy, language, and covers a wide field, with ample quotations from authors as various as Percival Pott, Charles Dickens, and J. S. Mill. Some of the material has special application to South Australia, and some of the rest will be familiar to any doctor; but the medical officer of health in this country may find the clear presentation useful in his activities in health education.

Infectious Diseases in England and Wales

Disease	Week ended April			
	6	13	20	27*
Diphtheria	9	3	7	7
Dysentery	1051	1171	875	570
Encephalitis:				
Infective	4	4	4	2
Post-infectious	1	4	6	2
Food-poisoning	204	194	209	134
Measles, excluding rubella	25,280	27,276	21,857	26,960
Meningococcal infection	29	24	19	35
Ophthalmia neonatorum	32	27	31	21
Paratyphoid fever	3	3	4	2
Pneumonia, primary or influenzal	466	497	386	425
Poliomyelitis:				
Paralytic	17	22	26	44
Non-paralytic	20	15	16	19
Puerperal pyrexia	204	205	193	248
Scarlet fever	878	740	568	542
Smallpox	..	..	..	..
Tuberculosis:				
Respiratory	583	697	555	570
Meninges and C.N.S.	10	10	9	9
Other	76	79	64	59
Typhoid fever	2	2	4	5
Whooping-cough	2768	2616	1896	2237

* Not including late returns.

Parliament

The National Health Service Contribution

As has already been announced, the Government proposes to introduce a Bill to institute a separate National Health Service contribution and to double the 10*d.* which is at present allocated to the service from the present joint National Insurance contribution. Since the proposals are an increase in amounts paid into the Exchequer the Bill has to be founded on a Ways and Means resolution, and in introducing this resolution on May 1 Mr. J. ENOCH POWELL, financial secretary to the Treasury, pointed out that the National Health Service element had always stood on a different footing from the rest of the combined payment. Unlike the rest of the contribution, it was paid from the Fund, where the rest remained, into the Exchequer; it did not constitute a qualification for receiving benefit; and, finally, whereas the rest of the combined payment was designed to meet the whole cost of the insurance benefits, it was never contemplated that this element should represent more than a fraction of the cost of the National Health Service. There had been a good deal of misunderstanding and misapprehension as to the nature, the amount, and the effect of the National Health Service element, and he thought it sensible that its entirely separate nature should be formally and explicitly recognised. In his report in 1942 Lord Beveridge had written:

"There is no obvious reason, apart from a desire to keep the insurance contribution as low as possible, why insured persons should be relieved of this burden wholly, in order that they may bear it as taxpayers. If importance attaches to preserving the contributory principle for cash benefit it attaches also to contribution for medical treatment. . . . There appears to be a case for including part of the cost of domiciliary treatment in the insurance contribution."

1. Southwood, A. R. The Bases of Public Health. Published by the Department of Public Health, Adelaide. 1957. Pp. 84.

Lord Beveridge had recommended that 10*d.* should be included in the weekly contribution for the purposes of the National Health Service, and it had been expected that this contributory element of finance would represent about a quarter of the gross cost of the entire service. But the gross cost of the service had risen from £170 million to £690 million, so that the yield of the 10*d.* today represented, not nearly a quarter, not something over 20% as was the intention of the 1946 Bill, but 5·8%. Mr. Powell agreed that when the increase in the gross national product was taken into account, the increase in real cost of the service was of course not so large as the gross figure suggested. But this did not affect the ratio of the gross cost which was financed by these contributions. It was, however, fair to take into account the charges now paid by patients. But even these payments and the contributions together only accounted for just over 11% of the gross cost of the health service, or scarcely more than half the amount which it was intended should be yielded by the contributory element. The increased contribution and the yield of the charges would still only represent some 17% of the gross cost.

The constitution of a separate National Health Service contribution, he added, would have an effect on the parts of the contribution eligible for taxation relief. Except for an employer engaged in trade or business, the National Health Service contribution would not in future rank as an allowance for tax purposes. In his view this change was logical because the benefits for which contributions were paid would be tax-free. Again if the N.H.S. contribution could count as an allowance it would mean that the higher taxation was, the more tax a person paid, and the higher his income was, the less he contributed towards the maintenance of the National Health Service.

Miss MARGARET HERBISON, who objected to the new contribution, pointed out that, though the gross cost of the National Health Service had risen, the proportion of the national income that went to it had fallen from 3·51% in 1948–49 to 3·24% in 1953–54. In the light of these figures it seemed to her that the Government had no case for raising the contribution. In particular, they had no case for imposing it on the low-wage earners, who would find it in the nature of a poll tax which they would be ill able to pay. Dame IRENE WARD seized the opportunity to ask what proportion of the new payment would come to her region—the Newcastle Regional Hospital Board—which when the N.H.S. started received a smaller share than more fortunate regions because it had fewer hospitals and fewer specialist services. Mr. ARTHUR BLENKINSOP, with local patriotism but little hope, supported her plea. The regional board was, in his view rightly, concerned that it had not been able to expand its specialist services. It had been restricted not only by the size of its allocation but also by the direct fiat of the Ministry of Health which was denying it opportunity to make appointments which, especially in the psychiatric service, were urgent. He feared that it was now the Government's object to finance the National Health Service in large part out of insurance contributions and charges. He believed that it was fairer to meet the undoubtedly heavy, but not unreasonable, cost of the service out of general national revenue. He feared that we were getting back to an insurance scheme, rather than maintaining the kind of National Health Service we had in mind in 1946.

Mr. RAYMOND GOWER thought that we were fortunate compared with countries which did not possess a health service, but we must be realistic. It would be dangerous if we got rid of our financial difficulties in financing the service by adding the cost to the general burden of taxation since we were so heavily taxed already.

Mr. DENNIS VOSPER, the Minister of Health, said that he did not wish to anticipate the speech he would make when introducing the Bill. But he reminded those who talked of hardship that between 1946, when the contribution was fixed at 10*d.* and 1956 there had been an increase in wage-rates of 70% and in earnings of 99%. Today the increase was still greater; therefore it seemed reasonable that there should be an increase in the contribution. The Government were anxious to establish in the minds of the public the part of the contribution that went to the health service, and the stamp would, in some form as yet to be determined, make this clear. But this increase in the contribution was not an increase in the total National Health Service finance. The contribution, in fact, would be only sufficient to meet the estimates of regional hospital boards already approved by the Ministers.

In his view the Opposition must face the fact that, if they were not prepared to increase taxation to a considerable extent to finance the whole of the National Health Service, they might have to increase the charges to patients. It would be possible for the Opposition to propose a hospital boarding charge. Was that in their minds? The House had not heard the answer. The Government's policy was that the health service should be financed in part, but in part only, by direct contributions paid by those who were fit and at work, and he believed that that was something which commended itself to the great mass of opinion of this country.

Radioactivity and Food Contamination

In a debate on the adjournment on May 3 Mr. HECTOR HUGHES asked the Government what steps were being taken to preserve the world's food-supply from contamination by strontium 90 released by hydrogen-bomb tests. Mr. J. B. GODBER, joint parliamentary secretary to the Ministry of Agriculture, Fisheries, and Food, said that research into non-medical biological hazards caused by radioactive substances was sponsored by a committee under the chairmanship of Lord Rothschild, the president of the Agricultural Research Council. The committee had been set up jointly by the A.R.C., the Medical Research Council, and the Development Commission, and its members included experts from these bodies and the Atomic Energy Authority.

Any danger from hydrogen-bomb tests, he said, resulted from the gradual radioactive fallout from the upper atmosphere. At present the danger of contamination of fish landed at our ports was negligible. The radioactive particles carried to the upper atmosphere by explosions in the Pacific and other distant areas drifted to all parts of the world before being deposited very gradually over a period of years on the earth's surface. In 1956 the A.R.C. embarked on a field trial at the Compton research station on the uptake of radiostrontium from the soil by barley, grass, and sugar-beet. The actual form of radiostrontium used for these experiments was strontium 89, which had a half-life of 54 days compared with strontium 90, which had a half-life of 28 years. This reduced the hazard and ensured that the land would not be put out of use permanently for agricultural purposes. The effects were identical. This experiment would give fundamental knowledge for the guidance of farming practice in the event of agricultural land becoming contaminated either by fallout from nuclear attack or from an accident to an atomic power-station. The chance of such an accident was remote but we must be prepared. The results had not yet been published, but he could say that the uptake of radiostrontium by the plants grown was less than 1% of the amount put down.

The soil at the Compton station was chalk downland, and the results were to be checked this year in five other soils. The Atomic Energy Research Establishment at Harwell, in coöperation with his department, had for some years been carrying out long-term investigations designed to show the uptake of strontium 90, due to fallout from nuclear explosions, in the soil, vegetation, bones, and milk. Nine sampling sites had been chosen, 2 of them in Suffolk, 3 in Wales, and 1 each in Cambridge, Norfolk, Devon, and Durham. The sampling was done by the regional officers of his department and samples were taken of soil, grass, and animal bones—sheep bones in particular. Apart from those investigations, large quantities of milk had been taken for analysis from areas as far apart as Somerset and Northern Ireland. The results were being compared with the results of similar work in the United States, and in addition they had organised a supply of samples of soil, grass, and bones from Commonwealth countries.

QUESTION TIME

Psychiatric Treatment for Prisoners

Sir LESLIE PLUMMER asked the Home Secretary how many prisoners sentenced to prison for sexual offences, and promised treatment for their abnormalities, in fact received such treatment.—Mr. J. E. SIMON replied: Prisoners sentenced for sexual offences receive psychotherapy if they are found suitable for treatment and if the sentence is long enough to allow of it. Particular attention is always paid to any recommendation by a court. In 1956, 60 men and boys sentenced for sexual offences received treatment by visiting psychotherapists, but I cannot say how many of these had been recommended for treatment by the court at the time of sentence. Sir LESLIE PLUMMER: Is it not clear that there is little validity in the statement made constantly by magistrates and judges to sexual offenders that when they go to prison they will receive the medical treatment which they should have for their abnormality? Does not this mean that there must be a rapid extension of the very admirable psychiatric work now going on in Her Majesty's prisons?—Mr. SIMON: We hope to extend that considerably when we get the new psychiatric institution at Grendon Underwood. Mr. ANTHONY GREENWOOD: May we take it from the Under-Secretary of State that he is not very happy about the facilities which are available? Can he give a rather more definite idea to the House when he expects the facilities to be made adequate?—Mr. SIMON: It would be very difficult to give a firm date for completion at Grendon Underwood, but a start is to be made this year.

Use of Drugs

In the House of Lords the EARL of CRAVEN asked the Government whether they would consider, in the light of conditions arising out of Dr. Adams's case, whether or not the time was appropriate for a review of the laws relating to the use of drugs for medical purposes.—Lord STRATHCLYDE replied that the Government did not consider it appropriate to circumscribe the clinical freedom of doctors to treat their patients in accordance with their individual judgment except in so far as a doctor's authority to possess or prescribe dangerous drugs might be withdrawn, after conviction of an offence under the Dangerous Drugs Act. The EARL of CRAVEN went on to ask if the Government were prepared to sanction euthanasia in any form. An answer to this question would give relief to a great many people in this country. LORD STRATHCLYDE said that this was a completely different question, and he asked for notice before he answered it.

Doctors for Colonial Territories

Mr. DAVID JONES asked the Secretary of State for the Colonies to what extent there were still vacancies for doctors in the Colonial Territories, after the 300 applications which he received each year from qualified doctors already in the National Health Service in this country had been appointed to the Colonial Medical Service and allocated their posts.—Mr. A. T. LENNOX-BOYD replied: There are generally some 120 to 150 vacancies at any given time, recruitment being roughly balanced by normal wastage and, in some cases, by expansion in territorial establishments. By no means all the 300 applicants take up appointments. Mr. JONES: How many of the 300 applicants have their applications rejected?—Mr. LENNOX-BOYD: Of the 300 applicants, approximately 45 are, on the average, rejected. Of the remainder, about half withdraw their applications or decline offers of appointment. Not all of these applicants are employed in the National Health Service.

Mental Hospital Superintendents

Mr. KENNETH ROBINSON asked the Minister of Health if he was aware of the increasing difficulty in obtaining suitable candidates for the post of physician-superintendent in mental and mental-deficiency hospitals, owing to the lack of any financial inducement to compensate for the extra responsibilities, and whether he had considered the views of the Bradbeer and Guillebaud Committees on this subject.—Mr. VOSPER replied: I am aware of the difficulty and the views which have been expressed on the absence of inducement to consultants to take posts as medical superintendents at mental and mental-deficiency hospitals. The level of remuneration of these officers is within the terms of reference of the Royal Commission. I do not feel able to comment further on it at present.

In England Now

A Running Commentary by Peripatetic Correspondents

THOSE who switch off their light after getting into bed, knock their heads gently on the pillow 4, 6, or 8 times, and fall into a sound sleep until 4, 6, or 8 A.M. are envied by many. But light sleepers who wake two or three times a night have learnt that even reduction of their sleep to five or six hours does not lead to ill health, and indeed may have compensations.

When I put down my book, switch off my light, and turn on my side, my room seems very dark; but when I wake two or three hours later it is alive with a dim light. This is caused by the projection, on floor, ceiling, and walls, of the distant street lights and the lights from neighbouring houses. These are mostly dim, but after my sleep my eyes can appreciate them readily. Sometimes a bright light suddenly appears and I know that one of my neighbours, too, is awake. These lights always give me a sense of company during the night. The large patch of sky which I see from my bed is rarely so dark that I cannot distinguish it from the house-tops, and it may be very light indeed when the moon is about on a clear night. It also may be light when there are high clouds, which reflect the lights of London. The planets, Jupiter, Mars, and, in the early morning, Venus, appear bright to my dark-attuned eyes. A few months ago Jupiter and Mars were very close together. I considered setting my alarm to see how close they would be the next night but decided to chance my luck. I woke at the right time and found them so close that they seemed to touch, and the next night they had separated considerably. I have also seen a planet nearly occulted by the moon in its last quarter. When such sights are visible I lie in bed with my eyes open until I fall asleep.

There are other pleasant sights and sounds. On the Ides of March this year a blackbird, who prefers to nest among the chimney-pots instead of in the bushes on the other side of the house, began to sing at 5.36 A.M. Soon after dawn I may see the starlings flying up from their roosting-places in Trafalgar Square to their feeding-grounds in the country. They differ in their habits from some of my colleagues who prefer to work in town and sleep in the country. (These might be said to crawl there in comparison with the starlings.) Later still come the pigeons and in the winter the gulls, which wheel above the house-tops until someone comes to feed them, when they sweep down in great circles. Twice in twenty-two years I have seen a kestrel hovering over Great Portland Street (I have not had the good fortune of a colleague who once saw a peregrine falcon flying along the Euston Road).

All these sights and sounds add interest to the hours when I lie awake. Provided I have had a pleasant day, recalling the events, say, of a game of golf, is a diversion. But if the day has been difficult, my thoughts are sometimes too disturbing to let me sleep. If so, I switch on my light and eat a digestive biscuit, which has the great merit that it crumbles easily against my almost toothless gums. After various trials during the past forty-odd years I have decided that a drink of very hot water helps me more than any other drink. I fill my 'Thermos' on going to bed and may eat and drink two or three times in the night. As to reading, I may continue the book I was reading before I went to sleep; but if I am very restless I take a book which I can skim easily, dealing with "raw heads and bloody bones." *Kim* used to be a great standby and I could pick it up anywhere, but of late an old detective story may suffice. Half an hour's reading is usually enough, but the process may have to be repeated more than once.

I also use the night hours to thresh out my difficulties and often solve them. When I am writing a paper I con the wording; or I think of a note such as this. When I wake in the night I rarely feel sleepy, but at 8 A.M. I may be very sleepy and loth to get up. When I was a busy house-physician I learnt to "go round" my wards, thinking of the problems of each patient, before I got up. I still like to think over the problems of the day, while still in bed—though these, alas, are now chiefly committees. To my mind those who sleep

soundly miss many pleasant and interesting moments and the opportunity to solve some at least of their day-time problems. I have long ceased to envy them.

* * *

The other day, as I copied the names and addresses from the visiting-book in our surgery, I noticed that I accepted with sweet reasonableness a visit requested because of "spots," but "no better" or "getting giddy turns again" provoked irritation. My reactions made me wonder whether it might not be useful to insert in the appendix to all textbooks of medicine a Comparative Table of Disease and Doctor's Time. My own version would be something like this:

1 passport photo = 1 eye form = ½ rubella.
2 rubella = 1 chickenpox.
3 chickenpox = 1 measles.
3 measles = 1 whooping-cough.
17 whooping-cough = 1 fat pink boy who's "had a cough for 3 years, doctor. Never sleeps a wink with it. Hasn't kept anything down for 2 years. Had whooping-cough 8 times without the whoop, his last doctor said."
2 fat pink boys = 1 "only 94 and I don't seem to have any go in me, can't you give me a tonic?"
9 tired 94's = 1 chronic endogenous depression who has "seen most of the best psychiatrists in Europe and the last young specialist I saw said he couldn't give me the E.C.T. any stronger without stopping all the trains on the Inner Circle. But I'm no better and I'll pop round again tomorrow, doctor."

* * *

Restaurateurs' menus can be disturbing to the uninitiated, but my niece, aged 10, sees through them. Lately, she accompanied me to lunch at one of those small Belgravian restaurants where the décor is modern and the dishes recherché. She enjoyed an exotic preparation of "Filets de Sole à la Crème aux Champignons avec Sauce Mornay, les Petits Pois à la Nivernaise et les Pommes de Terre Dauphin." To her mother's inquiry later as to what she had had she replied without hesitation "fish and chips."

* * *

Away goes another illusion. That oft-quoted example of the perfect egalitarian community, the beehive, has let us down. It is indeed sad to learn that the famous waggle dance of the bee, far from being a conscious rallying effort for the good of the State, is but an elaboration of a primitive and innate reaction to a satisfactory meal.

An American biologist has shown that the common blowfly, a lone forager and confirmed individualist, can be made to perform a similar dance—with no audience—when its taste-organs are stimulated with a solution of sugar. This, he says, is simply an automatic reflex, whereby the fly hunts around hoping for more in the vicinity of the first find. Moreover, the complexity, duration, and extent of territory covered by the dance increases with the strength of the sugar solution, just as the vigour of the bees' dance is related to the concentration of the nectar collected. The bee apparently cannot even claim that its habit of regurgitating nectar from its honey sac on return to the hive is a desire to share with its fellows. The fly also regurgitates, and this we are told is in order to restimulate the taste-organs, and so reinforce the reflex and prolong the period and extent of the "food-searching" dance. Alas, it is for this purpose that bees, like the flies, gorge themselves to repletion when they chance on a food depot.

Thus the mystic "information" dance of the bee is but a delayed reponse to an effective taste stimulation, whose pattern and duration are controlled by the nasty habit of regurgitation of food from an overloaded stomach. According to the biologist, the complex and highly organised life of the hive has its origin in a primitive and wholly selfish individualistic rite.

* * *

Alas for the days when it was *de rigueur* for doctors to be properly dressed. The other day I went across to the ward to see a new patient. I was wearing a (slightly faded) black suit with striped trousers. The poor man was asleep when I approached, and got a terrible shock when he woke to find me standing by his bedside. He was sure I must be the undertaker.

Letters to the Editor

SENIOR REGISTRARS AND CONSULTANT APPOINTMENTS

SIR,—I write to support the letter of Dr. A. G. Freeman in your issue of April 27 and to congratulate you on the prominence which you gave to it. I find the Ministry's neglect of the senior registrars' problem as alarming for the future of medicine in this country as their refusal to negotiate in the matter of remuneration. When I stated, in a combined regional-hospital-board/board-of-governors medical committee the other day that there were too many senior registrar posts, a first-rate medical administrator retorted that the number had been fixed by the Ministry's statisticians—and, presumably, therefore we were intended to conclude that the number was right. From the figures in your table (April 13, p. 785) we may more correctly conclude that either the statisticians were wrong or they planned for an expansion of the consulting service which has not occurred.

I agree with Dr. Freeman that the appointment of senior registrars to non-teaching hospitals should be discontinued—at least in general medicine. It may be that in other specialties, such as general surgery and pathology, the non-teaching hospitals have more to offer the senior registrars. I am now convinced that in general medicine, although we may improve the experience of senior registrars, we do not promote their professional progress. Moreover, there is work waiting for consultants in non-teaching hospitals. In the group of hospitals which I serve we have an urgent need for another general physician and another general surgeon.

I do not agree with Dr. Freeman that these new consultants (again, at any rate in medicine) should be of assistant status. By the time a young physician has completed four years as senior registrar (doffing his cap and saying, "Sir, how splendid are your physicianly qualities and how unworthy am I, Sir, to take up your stethoscope") he should be independently fulfilling his own promise. This is the way of English medicine and it should not be lightly discarded.

Derby. DOUGLAS HUBBLE.

FATS AND DISEASE

SIR,—The question of the effects of dietary fats on serum-cholesterol concentration, and the larger issue of the rôle of diet in the promotion of coronary heart-disease, needs more facts and less argument. We do not propose to meet the letter from Dr. Kinsell and Dr. Sinclair in your issue of April 27 in a similar polemic defending one point of view and attacking all others, but your readers may be served by providing a few facts.

In the first place it is simply not true that in our experiments[1] "the actual qualitative and quantitative fatty-acid composition of the oils was completely unknown." The sardine oil used, prepared from *Sardinops cærulea*, the California sardine, was found to have an iodine value of 188 and saponification value of 174. We did not attempt a detailed analysis of the extremely complex lipids in this fish oil but for these purposes were content with the finding that this oil was, indeed, very highly unsaturated as is typical of the fish oils. And we noted that such fish oils have been universally found to be low in linoleic acid and to contain only very small amounts of arachidonic acid. Aliquots of the other oils were stored in full containers at −20°C and at the end of the experiments these were analysed blind by the research division of Procter & Gamble Co., with the following results for corn and sunflower-seed oils respectively:

Iodine value: 123 and 140. Percentages of the fatty acids: saturated 15·8 and 10·3; mono-ene, 26·2 and 18·2; diene, 56·6 and 70·8; triene, 0·7 and 0·1. Trans acids amounted

1. Keys, A., Anderson, J. T., Grande, F. *Lancet*, Jan. 12, 1957, p. 66.

to 0·7% and 1·3% respectively, while conjugated dienes were less than 0·6% in these oils.

Kinsell and Sinclair state that the efficiency of absorption of the oils in our experiments was "apparently unknown." We are unaware of any evidence that fresh oils such as we used are not well absorbed by man, and we do know that their ingestion by our subjects was not productive of any steatorrhœa or change in calorie equilibrium. Since the test oils provided more than a fourth of the total calories in the diet, any significant failure of absorption would have caused a loss of body-weight.

It may be that changes of 9·3 and 20·2 mg. of cholesterol per 100 ml. of serum "would be regarded as being within the range of spontaneous fluctuation" in the laboratories of Kinsell and Sinclair. They are unaccustomed to studying groups of men in controlled cross-over experiments and so apparently pay no attention to statistical analyses or the significance of mean changes of 14 and 12 men, respectively, that are 3·3 and 5·4 times the standard error. Incidentally, these changes are in the *opposite* direction to those expected if conformity existed with the hypothesis that either linoleic-acid content or degree of unsaturation were the controlling factor in such comparisons.

Kinsell and Sinclair ask about comparison of olive oil with cotton-seed oil. Such comparisons with 16 men subsisting for four weeks on each oil in a strictly controlled cross-over experiment, and with 12 men in a similar experiment with two-week cross-over periods, are provided in a paper currently in the press on the Effects of Different Food Fats on Serum Cholesterol Concentration in Man.[2] No significant differences were found.

We have been conducting experiments with safflower oil which is remarkable for its very high content of linoleic acid (70–80%) and correspondingly high iodine value. The effect of safflower oil on serum-cholesterol in man is less than that of corn oil. An interesting demonstration of this fact was made recently by the University of Minnesota Medical School class in physiological chemistry. The serum-cholesterol response to the daily ingestion of 57 g. of fat was studied in 141 students. This admirable class exercise, under the guidance of Prof. W. D. Armstrong, which is now ready for publication, showed lower serum-cholesterol levels on corn oil than on safflower oil, both by the students' analyses and by our own which were made "blind." The oils used, analysed by Dr. R. T. Holman of the Hormel Research Institute, proved to have, respectively, iodine values of 126·7 and 144·2, with linoleic acid comprising 57·5 % and 72·0 % of the fats.

We should call attention, also, to the recent study of Beveridge, Connell, and Mayer,[3] from which they conclude, "The results demonstrated unequivocally that the plasma cholesterol depressant effect of corn oil depends to a large extent upon its sterol content."

Kinsell and Sinclair state: "It is known that the feeding of a synthetic triglyceride containing unsaturated fatty acid is associated with a major decrease in serum-cholesterol as compared with the level existing during the ingestion of an equal amount of vegetable fat essentially devoid of unsaturated fatty acid," and they cite as evidence a letter to the editor of the *American Journal of Clinical Nutrition*.[4] We should have thought it wiser to attempt to forget this little note but, since it is again seriously offered as evidence, it must be examined.

The synthetic triglyceride was stated to have the following fatty-acid composition: oleic acid, 74%; palmitic acid, 19%; stearic acid, 5%; linoleic acid, 2%. Approximately 100 g. of this fat was ingested daily by a single patient and "a prompt and profound decrease in plasma cholesterol occurred." If we were to credit this report, we must conclude that the linoleic-acid content of this fat could explain no part of the reported effect, since the synthetic triglyceride they used is as near to being devoid of linoleic acid as any natural fat or oil we know about. The equivalent fatty-acid composition would be approached by beef tallow plus a little olive oil. Natural (unhydrogenated) coconut oil contains about 2% linoleic acid while butter-fat and lard usually contain about twice and four or five times as much, respectively. If the "essential" fatty acid was the effective agent, butter-fat should have the same effect only much more so. But, since this synthetic material was reported to cause a fall of around 100 mg. of total cholesterol per 100 ml., to a value between 100 and 150 mg. per 100 ml., perhaps it contained some remarkable factor not indicated by the fatty acid composition, and Kinsell and colleagues should make it available to the pharmaceutical trade.

We should have thought it was clear enough in our letter of April 13 that we do not deny an important rôle of degree of fatty-acid saturation in the effect of dietary fats on serum-cholesterol. Our evidence is that the saturated fats have a powerful cholesterol-raising effect, that the mono-ethenoids (or more specifically, oleic acid) cannot be very influential, and that the poly-ethenoids have a cholesterol-depressing effect which is considerably less powerful, per gramme, than the opposing action of the saturated fats. Further, our evidence indicates that corn oil has an effect additional to that which may be ascribed to its fatty-acid content. As of this date, we are unaware of any significant published data with which these conclusions are inconsistent.

ANCEL KEYS
JOSEPH T. ANDERSON
FRANCISCO GRANDE.

Minneapolis, Minnesota.

2. Keys, A., Anderson, J. T., Grande, F. *J. Nutrit.* (in the press).
3. Beveridge, J. M. R., Connell, W. F., Mayer, G. A. *Fed. Proc.* 1957, **16**, 11.
4. *Amer. J. clin. Nutrit.* 1956, **4**, 285.

PULMONARY COLLAPSE IN CHILDREN

Sir,—Your excellent annotation [1] was very stimulating. James et al.[2] may indeed be congratulated on their presentation of the natural history of pulmonary collapse in childhood. In their study of 5000 consecutive chest radiographs in children, 854 patients were diagnosed as having pulmonary collapse. The follow-up study in 472 patients was completed and analysed ætiologically, but no mention is made of cystic fibrosis of the pancreas except for a passing reference in the miscellaneous group of 29 children—9 cases, all fatal.

Our experience in the New England area shows that pulmonary collapse, lobar and segmental, transient and persistent, is not uncommonly a feature of cystic fibrosis of the pancreas. The incidence of this disease is about 1 in 600 children; it forms 3–6% of all admissions in the large pædiatric hospitals, and causes about 5% of hospital deaths. In this Center a study of some 600 cases of mucoviscidosis confirms the common association with pulmonary atelectasis and bronchiectasis (5–15%).

Of additional interest in the study by James et al. is the anatomical distribution of lobar and segmental collapse. As a whole, the right lung had a greater incidence of collapsed segments than the left; but of the lobes, the left lower had the greatest incidence and the right middle the next greatest. Their explanation that collapse is due to the left lower-lobe bronchus being obstructed by aspirated and secreted mucopus, and the right middle-lobe bronchus becoming occluded by enlarged hilar glands with or without erosion, may be true in many cases. Di Sant'Agnese's [3] and our observations, however, both suggest that the prevalence of collapse in the right lung (mostly right middle lobe) in many patients with cystic fibrosis of the pancreas is due to endobronchial obstruction with viscid, highly tenacious, bronchial secretion. Our experience points to the fact that, for instance, many patients treated for asthma or some others suspected to have pulmonary tuberculosis have been proven in this Center to have cystic fibrosis of the pancreas with or without pancreatic-enzyme deficiency.

We have also studied 6 children with mucoviscidosis [4] having predominant respiratory difficulties in whom lobectomy was performed for persistent lobar or segmental collapse or bronchiectasis or both. In 4 of them the diagnosis was made pre-operatively, but in the other 2, aged 3 years and 8 years, the diagnosis was not made until six and twenty months respectively after operation, when the children were referred to the

1. *Lancet*, 1956, ii, 1342.
2. James, U., Brimblecombe, F. S. W., Wells, J. W. *Quart. J. Med.* 1956, **25**, 121.
3. Di Sant'Agnese, P. A. *Pediatrics*, 1953, **12**, 178.
4. Kulczycki, L. L., Craig, J. M., Shwachman, H. In the press.

clinic. In all 6 children the histopathological changes in the resected pulmonary segments were typical of or compatible with cystic fibrosis. The recent introduction of a diagnostic chloride-imprint test [5] has made it possible to confirm this disease within a matter of minutes, and a large number of children can be screened within a short period.

Pulmonary atelectasis may indicate cystic fibrosis of the pancreas, and it is important not to overlook the association. Further, mucoviscidosis may also be responsible for occasional localised bronchiectatic changes or collapse and therefore should be considered in every case where a lobectomy is suggested.

The Children's Medical Center, Boston. LUCAS L. KULCZYCKI.

SALMONELLÆ IN REPTILES

SIR,—I refer to your annotation of March 23. In Cape Town there is a very high summer incidence of gastro-enteritis. We have many flies but no reptiles in the urban area. A colleague who had worked in Ibadan remarked recently that, despite the primitive sanitation, flies there were scarce and the incidence of gastro-enteritis was very low. It was suggested that the abundance of lizards in that hot climate kept down the fly population, which was a prominent vector of salmonellæ. If that is so, this observation suggests that reptilian excreta are not so dangerous as human.

Salt River, Cape Province. L. RUSKIN.

UTERINE ELECTROLYTES IN PREGNANCY AND LABOUR

SIR,—We were delighted to read the letter of Dr. Hawkins and Professor Nixon (April 20) with its valuable criticism of our short communication and confirmation of the main clinical point raised—namely, that uterine inertia can be associated with a reduction of potassium in the myometrium.

We quite agree that part of the "normal labour" group may have contained a number of cases of trial of labour which had gone on long enough to be on the borderline of uterine inertia, or which would have been uterine inertia had they been left. This selection is in part necessitated by the very conservative approach to cæsarean section in Czechoslovakia. There is a far smaller incidence than in England, and an elective cæsarean section is quite rare, except for cases of placenta prævia diagnosed beforehand, which is itself a rare occurrence. Since a trial of labour is the rule, this limits the possibilities of selecting patients at various stages of labour, and since we are unwilling to biopsy a healthy uterus in a young woman of childbearing age to the extent required for muscle analysis, our selection of non-pregnant controls was also to some degree compromised—a necessary compromise we feel.

Hormonal explanations are very much the vogue in dealing with electrolyte changes these days, but it is perhaps a mistake to neglect other factors. Acidosis per se can lead to a loss of K from muscle cells, and a metabolic acidosis is often found during labour, particularly after the prolonged labour of uterine inertia. Drs. Vedra, Hoder, and Stenbera (to be published) in Prague have been following blood lactic-acid levels and other effects of acidosis on carbohydrate metabolism during labour, and have found significant effects. Moreover, the factor of local anoxia, which would lead to similar tissue changes, cannot be ruled out at present.

We would ourselves be very hesitant about drawing conclusions from either the determined level of K concentration in the serum, or the calculated level of K concentration in myometrial, or any other, cells. The correlation of serum-K with cellular levels is seldom reliable except in extreme cases, and since one does not really know how much cell K or H_2O is bound, it is not very meaningful at present to speak of concentrations in the intracellular fluid under such conditions.

We would finally broach the point that the borderline between a "physiological" K loss from cells and a "deficiency" is not necessarily an easy one to recognise, particularly since the latter word is a more general clinical term which should include some data on the total K balance in more quantitatively significant tissues than myometrium. The word "physiological," when used in a clinical situation, should, we feel, connote whether a given process is advantageous to the patient or not, and we would ask whether any loss of K from the myometrium, whether covered by the term "physiological" or "deficiency," is advantageous or disadvantageous to the patient in labour.

Prague, Czechoslovakia. R. L. CORT
J. H. CORT.

ON THE UTILITY OF THE WORD *FÆX*

SIR,—There are, in the vernacular, two words which approximate in meaning to the commonly used *fæces*. One is used exclusively as a substantive to denote a discrete mass of fæcal matter, the other as a verb or noun. Their persistence through the centuries attests as well to their utilitarian as to their scatological value. Physicians need an acceptable word which will permit the greater flexibility inherent in our Anglo-Saxon heritage. *Stool* does not meet this need; it lacks sharp definition and is employed variously—to go to stool, pass a stool, stool of such and such measurements, formed stool, watery stool, &c. *Fæces*, a collective noun in plural form, also lacks precise meaning.

It is the singular which we require; this will permit us to say, in one word, that unit of a formed stool delimited by two successive anal sphincteric contractions. *Harper's Latin Dictionary* (1907, p. 720) gives *fæx*, *fæcis* as this singular. The diphthong suggests that the word be pronounced *feex*. Some clumsy circumlocutions might be avoided by incorporating *fæx* into our medical vocabulary.

New Orleans, Louisiana. VINCENT J. DERBES.

THE LIVER IN HÆMOCHROMATOSIS

SIR,—In your leading article (Feb. 23), you draw the conclusion that African studies support the view that the influence which leads to cirrhosis also leads to increased absorption of iron. The facts available do not seem to support this view.

Most abnormal livers in the South African Bantu, in whom siderosis is common, fall into two categories:

(*a*) *Livers with a severe coarse cirrhosis*, the histological features of which (in most cases) suggest post-necrotic origin.[1] This type of cirrhosis is unrelated to the presence of siderosis.

(*b*) *Livers with a fine portal fibrosis*, which develops into a true septal cirrhosis only occasionally. The relationship of fibrosis to siderosis in this group is striking, and in some cases there is evidence of liver cell degeneration associated with hæmosiderin deposition.

It is thus possible that, in the Bantu liver, iron-pigment deposition may not be benign. Further, the histological picture also suggests fibrosis secondary to iron-pigment deposition, which is in contrast to experimental work, when, however, iron is almost invariably deposited in a healthy liver. In these cases the iron-storage pattern in the body is different from that seen in classical hæmochromatosis, and diabetes mellitus is not a feature.

That the mechanism of iron absorption is abnormal in the African has yet to be proven. Walker and Arvidsson [2] have brought forward considerable evidence that it is unnecessary to postulate such an abnormality to explain the widespread visceral siderosis found in the Bantu of

5. Shwachman, H., Gahm, N. *New Engl. J. Med.* 1956, **255**, 999.

1. Higginson, J., Grobbelaar, B. G., Walker, A. R. P. *Amer. J. Path.* 1957, **33**, 29.
2. Walker, A. R. P., Arvidsson, U. B. *Trans. R. Soc. trop. Med. Hyg.* 1953, **47**, 536.

Southern Africa. Moreover, Bothwell et al.[3] were unable to demonstrate abnormal iron absorption in 4 patients with Bantu siderosis.

The significance of diet in Bantu siderosis has yet to be established. While it is true that diet has been shown to influence the absorption of iron in animals, this seems to be because conditions inside the bowel render the iron less easily available to the mucosa for absorption rather than because the mucosal barrier is damaged. In rats fed a diet of maize, porridge, and sour milk supplemented by iron, I was unable to demonstrate increased iron deposition as compared to a control group on a stock diet.

I would therefore subscribe to the view that as yet it cannot be stated that the factors causing siderosis and cirrhosis in the Bantu patient are the same, or that dietary pattern (apart from excessive iron intake) is a major factor in African siderosis and liver cirrhosis in this region.

Geographical Pathology Unit,
South African Institute for Medical Research, Johannesburg. JOHN HIGGINSON.

VACCINATION AND THE EPIDEMIOLOGY OF POLIOMYELITIS

SIR,—Your editorial of April 20 on formolised poliomyelitis vaccine says: "when children are vaccinated first, the young parents may for a time be more commonly exposed to the risk of paralytic infection as a result of inapparent infection by virulent virus in their children." This statement has already caused anxiety, which may be unjustified, to parents about to have their children vaccinated. With a properly prepared and tested vaccine no live virus is being introduced into the community which was not already circulating naturally. The supposed risk to parents can thus arise only because they are being exposed to infection which they would avoid if they were able to recognise the illness in their children. You cite evidence that in an unvaccinated population there may be 32–496 subclinical infections to every clinical case, so that at best it is possible for anybody to recognise no more than 3% of those who expose him to risk of infection.

It is almost impossible to distinguish non-paralytic poliomyelitis from other forms of aseptic meningitis so quickly that the patient can be isolated before others are exposed to risk, while the appearance of paralysis which makes the diagnosis simpler is often too late to serve as a warning. The recent studies of Littell and Smith [4] and of Spicer and McDonald [5] underline this by the demonstration that multiple cases in families are usually so close in time of onset that quarantine measures taken after the appearance of the first case would have little value. It seems that vaccination might conceal a very small proportion of the infections which expose patients to risk, but that in any case the recognition of an infection in a child gives the parent very little opportunity of protecting himself.

You further state: "we do not know whether vaccination of children by existing methods will protect them until they have reached the young adult age, at which infection is more likely to cause severe paralytic disease." In this, formolised poliomyelitis vaccine may well be no different from other immunising agents. It is not apparent why prolonged immunity could not be as readily obtained by reinforcing doses of a formolised vaccine rather than by the use of live attenuated virus. Indeed, the international requirements for vaccination against smallpox or with yellow-fever vaccine would seem to imply that the live-virus vaccines do not always produce life-long immunity. Furthermore, the recent studies in Belfast suggest that with the use of live attenuated virus there may well be a risk to the parents of vaccinated children.

London School of Hygiene and Tropical Medicine, W.C.1. J. KNOWELDEN.

CLINICAL COMPARISON OF DIAMORPHINE AND PHOLCODINE

SIR,—In your issue of April 27 Dr. Snell and Dr. Armitage introduced a very useful method of sequential analysis for the evaluation of clinical trials.

I must, however, disagree with the title of the paper, "Clinical Comparison of Diamorphine and Pholcodine as Cough Suppressants," since the authors have compared 'Lipect' with diamorphine linctus *B.P.C.*, the former containing, inter alia, antazoline and liquid extract of ipecacuanha, and the latter oxymel, all of which are far from being inactive ingredients.

Dr. Snell and Dr. Armitage show that:

(*a*) Lipect is superior to the placebo;
(*b*) the placebo is inferior to diamorphine linctus; *but*
(*c*) "at the 5% level of significance there was no evidence of difference between the heroin and pholcodine preparations."

I submit that the latter conclusion really refers to diamorphine linctus and lipect and that, had the test been carried out with only one of each of the drugs under test in an inert base containing, perhaps, some flavour to mask the taste of pholcodine, then a truer evaluation of the effectiveness of the two drugs would be obtained.

This is especially true in this case since the difference is only borderline at the 5% level and such a standardisation of vehicle for the drugs (and placebo) might tip the balance in favour of one or other of the drugs.

School of Pharmacy,
Brighton Technical College. JAMES C. PARKINSON.

GOVERNMENT AND PROFESSION

SIR,—Dr. McCallum (May 4) seems to take great exception to letter of "Blackleg" (April 27), but are there not several good points in it—particularly the last paragraph about negotiating terms of service instead of talking about principles?

I wonder if Dr. McCallum remembers a little booklet issued by the public relations department of the British Medical Association in 1948? It was called *The Doctors' Case*. On p. 6 is the following: "The dispute is not about money. The government has treated the profession fairly enough in its arrangements for deciding what doctors should be paid. The issue is a matter of *principle*."

Dr. McCallum says that to do everything by postal ballot would increase the subscription by at least one guinea. Does he forget that, before the last election for the G.M.C., doctors were circularised with documents asking for the support of certain candidates? This was done through the B.M.A. organisation but I have not heard yet that the action was as expensive as he suggests.

Worthing. HAROLD LEESON.

SIR,—Nothing could be more alarming than Dr. Grant's suggestions (April 27) for revising the system of payments to practitioners.

Rewards given to doctors for keeping their prescribing costs low, for reducing the certified days off work of patients on their lists, and for reducing the number of patients sent to hospital would mean, quite simply, that a doctor would not be rewarded for good doctoring but for his part in promoting public economy. Heaven knows what kind of desperate cut-pricing competition this would lead us to.

Apart from the objections I have mentioned, Dr. Grant's system smacks too much of good marks for the good boys with yet more work for the bureaucrats and yet more control. Better by far the present abuse, which

3. Bothwell, T. H., van Doorn Wittkampf, H. V., Du Preez, M. L., Alper, T. *J. Lab. clin. Med.* 1953, **41**, 826.
4. Littell, A. S., Smith, G. V. *Amer. J. Hyg.* 1955, **61**, 302.
5. Spicer, C. C., Mc Donald, J. C. *Lancet*, March 2, 1957, p. 470.

has at least this to recommend it—that the patients do not suffer from cheese-paring physicians keen as governesses to pack them off to work after dispensing thrifty therapy. Nor is their admission to hospital delayed in order to provide points for the good boy.

Lancaster. FRANK S. RICKARDS.

SURGEON'S "PRIVILEGE"

SIR,—It is with indignation that I hear that the legal question of surgeons' meals in hospital (referred to in Mr. Capener's letter last week) has ever been raised.

How mean can hospital administrators become? If they are really interested in the saving of a few shillings a week in hospital expenditure, they should first assess the cost and necessity of their own tea-breaks and luncheons during their short and regular working hours.

It is the surgeon who sacrifices his night's rest, gastric mucosa, and blood-pressure in the interest of the patient. In Mr. Hamilton Bailey's words: "To a patient stricken with a catastrophe necessitating an operation, the physical fitness and mental alertness of his surgeon are almost as important as the surgeon's training and experience." For this reason alone, the surgeon needs adequate nourishment between operating sessions.

Who would grudge the hardworking surgeon his occasional frugal hospital meal? Certainly not the patient, or the nursing staff.

Royal Aberdeen Hospital for Sick Children, Aberdeen. BARBARA JUDGE.

INSULIN TREATMENT OF SCHIZOPHRENIA

SIR,—May I attempt a further defence of what appears to me an irrational but well-patronised remedy now being condemned on very slender evidence? It was unwise to get trapped by the irrelevant yardstick of discharge, but at least I seem to have been in the company of Dr. Ackner and his colleagues.

Consider their result in terms of clinical states. Clearly there was no difference in recovery-rate in the insulin and control groups (9/24 and 10/25), but this means nothing unless the precision of this apparent absence of difference is considered. Perhaps the best estimator in such a trial is the percentage difference between the recovery-rate in the two groups. Let us consider a result of the form:

	Insulin	*Control*
Recovered ..	a	b
Not recovered	c	d

This estimator will be $\left\{\left(\frac{a}{a+c}-\frac{b}{b+d}\right)\times 100\right\}$ % and will have a standard error of $\left\{\left(\sqrt{\frac{ac}{(a+c)^3}+\frac{bd}{(b+d)^3}}\right)\times 100\right\}$ %.

In the trial considered this standard error is about 14%, so that the only statistical inference that can be made with reasonable safety is that insulin therapy would be unlikely to benefit more than 20% of patients.

It would be interesting if exponents of this treatment would give their views on what percentage benefit should be expected. Suppose it were 10% (and this would be a most important contribution to the therapy of a common disorder), then such a trial could reject this claim with reasonable provisional safety, on statistical grounds, only if the precision of their estimate were such that it had a standard error of less than 6%. This would require well over 200 cases.

With such low precision available from such an analysis of such a trial it seemed reasonable to question the assumption that more was gained than lost by leaving the bedside. I did not intend to question the randomising of therapy.

As the function $\left(\sqrt{\frac{ac}{(a+c)^3}+\frac{bd}{(b+d)^3}}\right)\times 100$ will usually approximate to $\frac{100}{\sqrt{N}}$ in a blind trial of N cases in which a single response, such as recovery, occurs in from one-third to two-thirds of cases, this sets an absolute limit to the precision of a debunking trial of this type.

Conventionally, using a one-tail test at the usual level of significance, a claim that a worthless but harmless remedy has a benefit of p% will usually take more than $\left(\frac{165}{p}\right)^2$ cases to contradict on statistical grounds. If a 5% benefit is regarded as of practical importance (and who would forgo a 1-in-20 chance of recovery?) exponents of therapies need not be intimidated if such trials show "no statistically significant differences" unless the numbers exceed at least a thousand.

Birmingham. J. H. EDWARDS.

RELEASE OF HISTAMINE IN URTICARIA PIGMENTOSA

SIR,—The preliminary communication by Dr. Hamrin from Lund University, in your issue of April 27, is most interesting. Although patients with urticaria pigmentosa do not show intolerance to salicylates, those with chronic urticaria not infrequently do so. There are genuine cases of urticaria and associated reactions which are manifestations of true allergic sensitivity to salicylates. Their reaction occurs only in response to these drugs, and they would seem to have specific antibodies.

But apart from such instances, there are patients with chronic urticaria who are made worse by taking salicylates, and who improve but do not clear up when the drug is stopped. Their reaction does not appear to be a specific allergy. That salicylate may act as a histamine liberator in such cases (as suggested by Dr. Hamrin), and so aggravate the urticaria, would be an acceptable explanation.

St. John's Hospital for Diseases of the Skin, London, W.C.2. C. D. CALNAN.

THE ENANTHEM OF MONONUCLEOSIS

SIR,—Dr. V. G. Letsou [1] has lately discussed credit for priority regarding the description of palatal eruptions in mononucleosis. Dr. A. Holzel reported on this sign in *The Lancet* in 1954.[2] When I read Dr. Holzel's article I intended to write to you, but procrastinated. Earlier I had stated [3] that observation of a palatal enanthem was helpful in the diagnosis of mononucleosis, and, as far as I knew, Berberich and Thomas [4] were the first to describe this sign. Perhaps this letter will serve to evoke responses disclosing that this important sign was described even earlier.

U.S. Army Hospital, Fort Benning, Georgia. ROBERT J. HOAGLAND.

ALLOXAN AS A POSSIBLE THERAPEUTIC AGENT IN CARCINOMA OF THE LIVER

SIR,—I was particularly interested in Professor Gillman's communication (Jan. 12), for I myself have worked on this question for 22 years, and have applied alloxan therapy for several years.

My communications include a paper on the clinical and biochemical opposition between malignant neoplasms and diabetes mellitus, read to the Société de Médecine de Paris on Oct. 23, 1953, an article on diabetes and malignancy,[5] and a paper on alloxanic diabetotherapy and cancers, read to the Société de Pathologie Comparée on Jan. 8, 1957. English, German, and Spanish translations of the latter will soon appear.

I have treated many cancers of the liver with tangible results. I use only 80 mg. intramuscularly twice a week.

Paris, Ier. PIERRE GROBON.

1. Letsou, V. G. *J. Amer. med. Ass.* 1956, **162**, 1178.
2. Holzel, A. *Lancet*, 1954, ii, 1054.
3. Hoagland, R. J. *Amer. J. Med.* 1952, **13**, 158.
4. Berberich, W. F., Thomas, F. H. *U.S. Naval med. Bull.* 1949, **49**, 271.
5. Grobon, P. *Santé publ.* May 10, 1955.

TONSILLECTOMY

SIR,—Your annotation of April 20 was stimulated by my "Tonsils and Adenoids: Evaluation of Removal in 50 Doctors' Children,"[1] and it seems a little unfair, in view of my carefully worded title, to complain that I did not have a control series or say how many doctors' children I had decided not to operate upon in the same period of time. My belief that the operation was of great benefit for the conditions for which I undertook it was confirmed by my study of the results in these 50 doctors' children, and I would have felt a little unhappy and certainly not very helpful to my colleagues if I had refused to operate upon some of their children in order to use them as controls. Many experienced general practitioners and pædiatric physicians believe as I do, and I wonder if you are justified in stating that "it is fairly well known that introduction of controls shows that the operation makes no impressive difference." That statement is based on a small series which you suggested[2] would have shown the same result whatever the number. Comparable controls are very difficult to come by, and the numbers would have to be very large to equal out the variations. If you had applied the same kindly thought, exercising unbiased editorial outlook, to my small series, I think you would have been getting nearer the truth.

London, W.1. JAMES CROOKS.

HAZARDS OF EPOXIDE RESINS

SIR,—Your annotation of April 20 in my opinion calls for comment. A distinction should be drawn between the resin and the catalyst, as well as the finished polymerised resin product. My experience with the amine catalysts over the past 9 years has shown that the amines are the most dangerous hazard and sensitisation to any one is liable to cause further sensitisation to others. Boas-Traube et al.[3] and Dernehl[4] reported on the amines as skin poisons long enough ago to warn of the need for caution. There is also the further problem of dangers arising from the partially polymerised final compound, which if drilled, sawn, or otherwise worked may give off a fine dust which is also a marked irritant when inhaled.[5]

You state that "manufacturers of resins and hardeners are well aware of the hazards involved." If they are, then it appears to me that they could have done much more to prevent the trouble. They have not been outstandingly coöperative; in fact it is known that one company in U.S.A. had carried out considerable research on the toxicity of the glycidyl ethers, closely related compounds, and published its results in 1954. It is also known that another large producer in Europe has been investigating these compounds for some years without publishing data. In spite of this, the information on prevention has not been passed on in a satisfactory manner to users. It would appear that question of international patents complicates the publishing of complete data of the processes. I am indebted to Mr. W. Whitby for clarifying the position: he informs me that "in the U.S. the situation is quite different from that on the Continent of Europe because the U.S. Courts have forced the companies under the anti-trust laws, and also under the rulings re the Devoe and Raynolds patents, to form a patent pool. This has prevented to some extent the hold that "X" has on some patent operations in Europe. I discovered these various things in attempting to get information at an early date."

As far as prevention is concerned, I do not permit the use of gloves in the factories under my supervision. The sticky compounds cause the fingers of the gloves to adhere to each other. They dry and get hard, reducing manual dexterity considerably. An adequate barrier-cream, good washing facilities, a "no-touch" technique, and reasonable engineering application have been adequate to prevent any cases. The recent introduction of a resin-removing cream has eased the situation considerably. This will remove even the hardened resin from the skin without damage to the epithelium.

Unfortunately epoxide resins and amine catalysts are used in many small factories where no medical facilities are available and where the knowledge of protective methods is practically non-existent.

L. B. BOURNE
London, N.5. Senior medical officer, A.C. Cossor Limited.

1. *Practitioner*, 1957, **178**, 215.
2. *Lancet*, 1955, ii, 810.
3. Boas-Traube, S. G., Dresel, E. M., Dryden, I. G. C. *Nature, Lond.* 1948, **162**, 960.
4. Dernehl, C. V. *Industr. Med. Surg.* 1951, **20**, 541.
5. Bourne, L. B. International Congress of Industrial Medicine, Naples, 1954; *Trans. Assoc. industr. med. Off.* 1956, **6**, 94.

THIRTY-MINUTE SCREENING TEST FOR PHÆOCHROMOCYTOMA

SIR,—I wish to add my support to Dr. Frazer's remarks (May 4) on this test.

With this method, I too have recovered only about 30% of both noradrenaline and adrenaline added to urine, using either B.D.H. alumina (prepared as described in the original paper) or Woelm acid alumina (L. Light & Co. Ltd.).

Increasing the amount of alumina and eluting several times with acid did not increase the recoveries: recoveries of catecholamines added to water were, however, quantitative.

Pekkarinen[1] notes that there is a substance present in the eluate from urine which inhibits fluorescence. This effect is neutralised by using high dilutions, but this requires a sensitive fluorimeter for measurement.

Like Dr. Frazer, I seem to be a slow worker requiring almost two hours for one estimation.

Royal Sussex County Hospital, Brighton, 7. CLIFFORD RILEY.

SIR,—In reply to Dr. Frazer's comments I should like to give the following information which, to save space, I omitted from the original paper.

(1) In preliminary experiments using a fixed volume (200 ml.) of urine it was found that recovery of added catechols varied greatly (as judged by fluorescences obtained), the recovery from more concentrated urines usually being obviously lower. By using an aliquot ($^1/_{10}$) of a 24-hour collection diluted to 200 ml. these variations in recovery were greatly reduced. Since the standard is prepared always from a pooled urine specimen we are concerned only with variations in recovery *from urine* and comparison with pure noradrenaline standard is irrelevant.

(2) Although visual comparison of fluorescence is sometimes difficult, the specificity of adsorption on aluminium oxide at pH 8·5 is such that few interfering substances are present and urines having 2 μg. difference in added noradrenaline (equivalent to 20 μg. per 24 hours) can be distinguished. In one or two cases a blue fluorescence was seen and on these occasions or whenever a comparatively high fluorescence was obtained, the test was repeated including recovery estimations on the urine being tested.

(3) The aluminium oxide used (Merck) was dried, after washing and filtering by suction, by spreading on large sheets of filter-paper and leaving overnight in a warm room followed by heating in an oven at 100°C for one hour. As the same batch of aluminium oxide (kept in a stoppered bottle) was always used for unknowns and corresponding standards, variations in adsorptive properties were of no consequence.

The results given for urines tested were intended to represent only very approximately the levels of catechols present; the primary object of the test is to detect amounts in excess of 180 μg. per 24 hours. That it is

1. Pekkarinen, A., Pitkänen, M. E. *Scand. J. med. lab. Invest.* 1955, **7**, 1.

capable of doing so can readily be shown by a few tests on normal urines with and without added noradrenaline.

I fail to understand why any competent operator should require longer than half an hour to complete the test. We often carry out the whole procedure (including a standard preparation) in less than 30 minutes. Further, a modified form of the test (using $^1/_{50}$ of the 24-hour urine collection made up to 20 ml. in a large test tube and centrifuging only at the final stage) can be completed in 15–20 minutes.

Department of Biochemistry and Pharmacology, University College, Dublin. D. HINGERTY.

CLINICAL THERMOMETERS

SIR,—Having been the victim of a pyrexial illness, I have been wondering why the so-called half-minute clinical thermometer requires at least two minutes to record a correct reading, and why in domiciliary practice no adequate means of sterilisation has been devised to prevent the possibility of cross-infection.

London, W.2. F. WIDLAKE.

DEFINITION OF MENTAL DEFICIENCY

SIR,—The modern medical concept of mental deficiency is of social incapacity due to incompleteness of development of mind.

Thus, we find detained on order under the Mental Deficiency Acts not only the obviously idiot, imbecile, and feebleminded, but patients who might equally well be regarded as aggressive psychopaths, habitual criminals, or merely members of the "social-problem" group. Whatever our professional concept may be, there is no doubt that in the public's mind mental deficiency is identified with low I.Q. I feel it is the interpretation of this concept to include a wide range of I.Q.s which gives rise to the recurring allegations of wrongful certification.

It was repeatedly put to the Royal Commission on the Law relating to Mental Illness and Mental Deficiency that high-grade patients should not be cared for in the same hospital as lower-grade patients, and there is no doubt they resent being classified in the same way as patients in whom the defect is more obvious.

Those of us concerned with the care of mental defectives have been at some pains in the past to avoid the acceptance of the I.Q. as a basis for diagnosing mental defect. However, it seems to me that it would clarify the present position and ultimately improve the therapeutic possibilities if we limited the term "mental defect" to a condition of social incapacity with low I.Q. (below 70) and treated as a separate problem social incapacity with higher I.Q.s.

Patients falling into the latter group are often more in need of psychotherapy than of the type of training given in most mental-deficiency hospitals, and if they are considered to require institutional care, I suggest this should be given outside the provisions of the Mental Deficiency Acts. At present there is no other legislation to cover this group, apart from voluntary admission to a mental hospital. Most of these patients are not suitable for admission to the ordinary mental hospital, and there seems to be a need for separate accommodation for them. Where their voluntary admission was not considered appropriate, their admission could be obtained on magistrates' order after the presentation of a petition as under section 6 of the Mental Deficiency Act; such legislation should be incorporated in the Mental Treatment Acts.

I am aware that there will always be borderline cases, which will give rise to difficulty, but the sooner we stop calling the socially inadequate group with "normal" I.Q. "mental defectives," the sooner we shall remove a powerful source of resentment among these patients, the greater will be our chance of obtaining their coöperation in psychotherapy, and the less frequently will we be accused of wrongful certification.

Bristol. W. ALAN HEATON-WARD.

SERUM-CYANOCOBALAMIN LEVEL IN CHRONIC INTESTINAL DISORDERS

SIR,—Dr. Meynell and his colleagues (May 4) fail to do justice to the pioneer work of Dr. G. I. M. Ross and Dr. D. L. Mollin, at the Postgraduate Medical School of London, on the assay of vitamin B_{12} in human serum.

Ross [1] was the first to adopt a microbiological assay of vitamin B_{12} (that of Hutner and co-workers [2]) to the quantitative measurement of the vitamin in serum and other body-fluids, and to demonstrate that the serum-B_{12} concentration was unusually low in pernicious anæmia. In 1954, Mollin and Ross [3] gave details of serum assays in a variety of gastro-intestinal types of megaloblastic anæmia: included in this report were data obtained from 33 patients with idiopathic steatorrhœa, 13 of whom had low serum-B_{12} concentrations.

Neither of these papers are mentioned by Dr. Meynell and his colleagues.

Department of Pathology (Hæmatology), Postgraduate Medical School of London. J. V. DACIE.

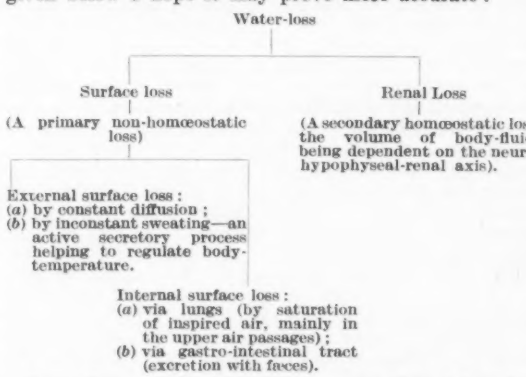
WATER-LOSS FROM THE BODY

SIR,—There is not, to my knowledge, any real justification for describing the combined water-loss from skin and lungs as "insensible loss." Thus, Le Quesne in his excellent monograph [4] says:

> Unfortunately there is no satisfactory term to describe this loss [entire losses from skin and lungs]. There are cogent objections to the use of the three most obvious terms—namely "insensible loss," "inevitable loss," and "extrarenal loss."

The chief drawback of such terms is that they describe qualities of water-loss which do not serve to illuminate our understanding of either their source or their nature. It is perhaps impossible to coin an ideally all-inclusive "blanket" term, but I suggest "surface loss" to replace the one most commonly used—"insensible loss."

At first glance this term might seem as vague as "extrarenal loss," but in the context of the classification given below I hope it may prove more accurate:


Water-loss
Surface loss
(A primary non-homœostatic loss)
Renal Loss
(A secondary homœostatic loss, the volume of body-fluids being dependent on the neuro-hypophyseal-renal axis).
External surface loss:
(a) by constant diffusion;
(b) by inconstant sweating—an active secretory process helping to regulate body-temperature.
Internal surface loss:
(a) via lungs (by saturation of inspired air, mainly in the upper air passages);
(b) via gastro-intestinal tract (excretion with faeces).

I use the word "surface" to express the *total* surface presented by the body to its environment, which is therefore external (mainly as skin) *and* internal (mainly as the lining of the gastro-intestinal tract and lungs). The term "homœostatic" in the above classification

1. Ross, G. I. M. *Nature, Lond.* 1950, **166**, 270.
2. Hutner, S. H., Provosoli, L., Stokstod, E. L. R., Hoffman, C. E., Belt, M., Franklin, A. L., Jukes, J. H. *Proc. Soc. exp. Biol., N.Y.* 1949, **70**, 118.
3. Mollin, D. L., Ross, G. I. M. *Proc. R. Soc. Med.* 1954, **47**, 428.
4. Le Quesne, L. P. Fluid Balance in Surgical Practice. London, 1955.

is used in the specific sense of the body-fluid homœostasis and does not include thermal homœostasis. A very small amount of water is lost via the secretions of the exocrine glands of lactation, salivation, lacrimation, and via the genital secretions. This loss could be included in the surface loss.

Department of Pædiatrics,
Whipps Cross Hospital,
London, E.11. AYUB K. OMMAYA.

SUBUNGUAL HÆMATOMA

SIR,—May I add a simple method for the relief of pain in a subungual hæmatoma, which I have been practising for years? It is very quick and effective.

An old pocket-sized surgical knife with a very narrow blade is used. The point has lost its sharpness and is more round. The knife is placed perpendicularly on the nail, with its point resting over the centre of the hæmatoma. It is rotated there and back with the thumb and index-finger exerting only light pressure. After a few movements the nail is painlessly penetrated and a few drops of dark and thick blood appear. These are wiped away and after a few more rotations with the knife all the blood of the hæmatoma is evacuated. The hole made in the nail in this way allows an easy escape of the thick blood.

Using a needle, safety-pin, or other similar pointed instrument, as advocated by some, is bound to cause pain, because it has to penetrate the nail enough before the blood begins to escape, the sharp point meanwhile pricking the sensitive subungual tissue. Using the old knife without a sharp point makes the hole in the nail larger before touching the subungual tissue.

London, S.E.25. A. FRY.

Obituary

GEORGE AUGUSTUS AUDEN

M.A., M.D. Camb., Ph.D. Birm., F.R.C.P., D.P.H.

Dr. Auden, who died on May 3 at the age of 84, was Birmingham's first school medical officer. When he was appointed in 1908 he was a consulting physician rather than a specialist in public health, but he was drawn to this comparatively new form of medical practice by his interest in education and children. His wisdom as a physician was matched by his learning as a scholar and antiquarian, and in letters to our columns he would quote from Sanskrit writings as easily as from the *Saga of St. Olav*.

He was the son of the Rev. John Auden, of Horninglow, Burton-on-Trent, and he was educated at Repton and Christ's College, Cambridge, where he was a Porteous medallist. After taking a first-class in the natural sciences tripos in 1893 he continued his medical studies at St. Bartholomew's Hospital where he won the Kirkes scholarship and medal and the Lawrence scholarship and medal. Having qualified in 1896 he held house-appointments in London at Barts and at the General Lying-in Hospital. Later he settled in practice in York and was appointed physician to the York County Hospital. In 1908 his interest in education led him to apply for the new post of school medical officer at Birmingham. There was strong competition for the appointment, but the committee was impressed by Auden's work for children at York County Hospital and his membership of the school board and education committee of the city.

At first the work of his new department had to be directed to relieve disease, but even in those early days he showed that he was far-sighted and broad-minded. In his first annual report he stressed the need for psychological help in "the many problems which beset educational effort." Much later his own ability to assess the psychological needs of children was recognised by his appointment as honorary psychiatrist to the Birmingham Children's Hospital.

During the 1914–18 war his work at Birmingham was interrupted by his service with the R.A.M.C. in Egypt, Gallipoli, and France. On his return he quickly took up the threads of his growing department. He was also "sanitary adviser" to the governors of Rugby School and demonstrator and later lecturer in public health in the University of Birmingham. When he was elected F.R.C.P. in 1919 he was one of the first school medical officers to be admitted to the fellowship. Meanwhile the emphasis of the work of his own service was happily shifting from treatment to prevention, and the chapters on nutrition and the milk-in-school scheme in his report for 1936 made clear that he recognised the school medical service's changing responsibilities. The following year, in his last report, he urged the need to re-examine its functions in the light of changing social conditions.

After he retired in 1937 he continued his work at the university, and in 1941 he was appointed to the chair of social medicine. He also wrote effectively and widely on public health, hygiene, psychology, and mental deficiency. More than most men he had resources in interests outside his own profession, and his study of history and archæology made his local histories of York and Birmingham valuable and scholarly works. His chief interest was the antiquities of the Scandinavian countries. He had translated Rathgen's *Preservation of Antiquities* and the official guide to the prehistoric collections of the Danish national museum, and he was a foreign member of the Society of Northern Antiquaries of Copenhagen as well as of the Society of Antiquaries of London.

A colleague writes:

Dr. Auden built up an excellent medical service for the schools in Birmingham by inspiring enthusiasm for a new development. He was rather impatient and suffered at times because others could not see so far ahead as he did, but the recent *Report of the Committee on Maladjusted Children* paid tribute to his far-seeing view. His interest and knowledge of those who are now called the handicapped was wide, and tribute was recently paid him by the Birmingham Education Committee who named a school for the partially sighted after him. This month's *Public Health* also refers to his recommendations.

Dr. Auden was extremely popular with his staff, always thoughtful and kindly, unassuming in his manner, with a strong sense of humour. He was extremely versatile with many interests. His erudition weighed lightly upon him, and yet it was glimpsed at times when he spoke of calling on a medical officer in Iceland and discussing Homer with him. Passing years did not diminish his many interests. He continued to attend the meetings of the Midland branch of the Society of Medical Officers of Health of which he had been a president. He was a successful wood-worker. He wrote articles on many subjects. His last, only a few years ago at the time of the Boat-race, was on the longevity of oarsmen. He kept up a lively and knowledgeable correspondence to the end. *Multis ille bonis flebilis occidit.*

Dr. Auden leaves three sons, one of whom is W. H. Auden, professor of poetry in the University of Oxford.

Appointments

DUNCAN, G. D., M.B. Aberd., D.P.H.: M.O., Leeds Regional Hospital Board headquarters.

GORDON, N. E., M.B. Belf., D.P.H.: M.O.H., Todmorden, and divisional M.O., West Riding of Yorkshire.

GREW, SHEILA M. E., M.R.C.S.: assistant M.O.H. and school M.O., Gloucestershire.

HOWARTH, E. C., M.B. Lond.: assistant M.O., Hertfordshire.

LINDSAY, G. G., M.B. Glasg., D.P.H.: deputy M.O., West Lothian.

LINTON, J. S. A., F.R.C.S.: consultant thoracic surgeon, Nottingham City Hospital.

MARTIN, J. R. M., M.B. Lond., D.M.R.E.: assistant radiologist, Royal Infirmary and General Hospital, Leicester.

MOORE, JEAN M., M.B. Lond.: assistant M.O.H. and school M.O., Gloucestershire.

SEN, S. K., M.B. Calcutta, D.G.O.: registrar in obstetrics and gynæcology, West Norfolk and King's Lynn General Hospital.

SHEARER, A. B., M.B. Queensland: medical registrar, Ipswich and East Suffolk Hospital.

WARD, A. J., M.B. Durh.: assistant radiotherapist (S.H.M.O.), Leeds regional radiotherapy service and Bradford Radium Institute.

Manchester Regional Hospital Board:

MCHUGH, JOHN, M.B. Durh., D.P.H.: deputy medical superintendent and assistant psychiatrist, Brockhall Hospital, Blackburn.

PURSER, D. W., M.B. Manc., F.R.C.S.: consultant traumatic and orthopædic surgeon, Lancaster and Kendal hospitals.

SIMS, A. J., M.B. Lond., F.F.A. R.C.S.: assistant anæsthetist, Bury and Rossendale group of hospitals.

Notes and News

THE INTERIM INCREASES IN REMUNERATION

SALARIES of hospital doctors and dentists up to and including the grade of senior registrar were raised by 10% from April 1. The corresponding increase for their seniors in the hospital service will be 5% from May 1. The new rates per annum for whole-time appointments (with the old rates in parentheses) are :

CONSULTANTS

Appointed earlier than 31.—Starting salary £1890 (£1800).
Appointed at 31.—Starting salary £2047 10*s.* (£1950).
Appointed at 32 or over.—Starting salary £2205 × £131 5*s.* to £3255 (£2100 × £125 to £3100).
The *maximum salary*, with the addition of the maximum distinction award, is now £5455, compared with £5300 previously.

SENIOR HOSPITAL MEDICAL AND DENTAL OFFICERS

Appointed earlier than 31.—Starting salary £1548 15*s.* (£1475).
Appointed at 31.—Starting salary £1601 5*s.* (£1525).
Appointed at 32 or over.—Starting salary £1653 15*s.* × £52 10*s.* to £2126 5*s.* (£1575 × £50 to £2025).

As from May 1, 5% will be added to the aggregate net remuneration of general practitioners—i.e., their remuneration after the deduction of practice expenses. The Government propose that the method of distributing this extra money between individual doctors should be the subject of consultations with representatives of the profession. The meeting of local medical committees last week recommended that the money should be accepted " without prejudice " and that negotiations should be entered into with the Ministry to decide the best method of distributing it.

Dentists taking part in the general dental service will receive on average an increase of 5% on their net remuneration (before deduction of income-tax). As practice expenses have to be taken into account, the actual increase will be 2·6% on the gross scale fees payable. The increase will be payable on all payment schedules dated on or after May 1. For dentists working whole-time at a health centre, the new scale will be :

Grade I.—£1575 × £52 10*s.* to £2100 (£1500 × £50 to £2000).
Grade II.—£1260 × £52 10*s.* to £1575 (£1200 × £50 to £1500).
Grade III.—£840 × £52 10*s.* to £1207 10*s.* (£800 × £50 to £1150).

Working in the National Health Service in Great Britain are over 10,000 senior hospital doctors and dentists, about 21,000 family doctors, and about 11,000 dentists. The estimated cost of the two " interim adjustments " is nearly £6 million (senior hospital medical and dental staff, £1,200,000 ; junior hospital medical and dental staff, £900,000 ; general practitioners, £2,500,000 ; dentists, £1,200,000).

EMPIRE RHEUMATISM COUNCIL

PRESENTING the report [1] of the Council for 1955–56, at the annual meeting held in the House of Lords on May 1, Dr. W. S. C. Copeman, the chairman, emphasised the importance of basic research in rheumatology lately reported. It has, for instance, been shown by electron microscopy that there are many different varieties of muscle-fibre ; further research will be needed to decide whether this has a bearing on extra-articular rheumatism.

The report refers to work done by the Council's three fellows. Miss I. H. M. Muir gives an account of the first isolation from cartilage of a complex of chondroitin sulphate and protein. Small changes in its chemical structure lead to large physical changes, which may explain some of the changes in rheumatic conditions. The linkage between carbohydrate and protein is probably an ester between the carboxyl group of a glycuronic acid and the hydroxyl group of serine. An esterase, by disrupting such bonds, may lead to loss of elasticity and increase of permeability—an effect similar to that of hyaluronidase. Miss Muir also reports the discovery of a new amino-sugar (talosamine) in cartilage.

Mr. J. K. Norymberski, DR. ING., reports biochemical studies of the steroid hormones—on the oxidation of corticosteroids with sodium bismuthate, the urinary excretion of corticosteroids in pregnancy, the ultraviolet absorption spectra of α-ketols, and the partial reduction of steroid hormones.

Dr. Madeline Keech has studied the structure of collagen and its possible relation to elastic fibres, and has been awarded the first prize in an international competition for the most outstanding contribution on the study of ageing.

Other investigations referred to in the report include a controlled psychological comparison of patients with rheumatoid arthritis and their siblings ; a study of antigen/antibody reactions ; and a survey to find out the prevalence of rheumatic disease in Leigh, Lancashire, where a 4% sample of the population is having clinical and radiographic examinations and blood tests.

The Council has launched an appeal for £250,000, in the hope that these promising lines of research can be followed up quickly and effectively.

1. Issued by the Council, Tavistock House North, Tavistock Square, London, W.C.1.

THE HEALTH OF EXECUTIVES

LAST year [1] Prof. Alexander Kennedy gave an account of the hazards of being an executive (hazards both to himself and to his firm), and gave some guidance in the avoidance of breakdown at the " top management " of industry. An essay on the Health of Executives by Dr. V. C. Medvei [2] reminds us that many large organisations are coming to see the advantage of " treating their executives like expensive machinery."

Greater use of automatic control may tend to eliminate both the skilled craftsman and the worker at the moving belt ; but the alphas (and probably the epsilons) of Aldous Huxley's brave new world will still be needed. Even if the unpheavals and degradation are less than some people fear, the time when the top executive (Kennedy's " generaliser ") is replaced by a robot is not to be foreseen. On the contrary, the current tendency to bigger and bigger organisations, which is creating Burnham's " managerial revolution," leads not only to an increase in the number of administrators but also perhaps to an increase in the sources of stress.

Medvei regards " health " as signified by resilience, stamina, equanimity, and self-reliance. Many leading personalities possess these qualities ; indeed the sickness-rates are lower in persons with large responsibilities than in the multitude. But even the higher resistance of these people may not suffice to protect them against breakdown if fatigue and stress are too severe. Everybody has weak spots, such as a familial tendency to a certain illness, and the effect of the stresses to which executives are subject (such as anxiety, fear, worry, and perhaps guilt ; irregular timetables ; and physical fatigue caused by travel, large meals, and alcohol) may act as triggers for illness. Some cannot stand the pace and fall out ; some can continue, but at the price of arterial disease or peptic ulcer ; while a few seem constitutionally hardy, able to remain fit despite every strain. Nothing can be done to give this hardiness to people who are not born with it ; and the organisation which has them for its leaders is indeed lucky. If the rest of the administrators are to avoid breakdowns, those who cannot stand the pace must be channelled into some backwater, and the middle group must be helped as much as possible.

The wise organisation, Medvei says, will insist on its executives having enough leisure, holidays, secretarial help, and comfort in travel and at work. (A New York textile firm has lately announced that its senior executives are to be given a week's holiday every seven weeks.[3]) Thus hours and methods of work should be adapted to the individual : one man will do as much in an hour (and be as exhausted at the end of it) as another in four hours ; one works best at night, another in the morning. Some firms have a scheme for regular medical examinations, even including X-ray and laboratory tests. But Medvei points to the danger of such overhauls : on the one hand they make for a false sense of security, and on the other they make people conscious of their health and worried about it. Moreover, an examination is not much use unless the physician is acquainted with the subject's background and the stresses he meets.

The executive's life outside the office must be considered. Here the social activities which are part of his work may be a burden. These should be reduced to a minimum and perhaps shared by some of the juniors. Board and committee meetings should be similarly pruned. The executive should be warned against over-exercise, and encouraged to relax (with an occasional sedative if need be). A change in surroundings and a hobby are both useful ; a purposeful hobby that is not an obsession will give meaning to life after retirement.

The head of an organisation, Medvei says, must be personally responsible for actively guarding the health of his colleagues ; and a continuing partnership between physician and executive is needed to get the best results.

1. Kennedy, A. *Lancet*, Feb. 2, 1957, p. 261.
2. Medvei, V. C. *Public Administration*, Spring, 1957. Obtainable from the Royal Institute of Public Administration, 76A, New Cavendish Street, London, W.1.
3. *The Times*, April 16, 1957.

THE BRITISH HOSPITAL IN PARIS

THE Hertford British Hospital in Paris was first opened in 1871, to provide medical and surgical care for indigent British residents. Lack of money forced it to close in 1952, but it has been redecorated and re-equipped to serve a dual function—the treatment of British soldiers and their families, and (in conformity with Sir Richard Wallace's original endowment) the treatment of British civilians, for whom 25 of the beds are reserved. French doctors and the doctors and nurses of the Royal Army Medical Corps will share the care of the civilians, who will pay for their treatment if they can. The needy will be provided for by the administrators of the original Hertford Hospital; they will not be a charge to public funds.

The hospital in its new guise contains 60 beds (in wards of not more than 3) including maternity wards, as well as 2 operating-theatres and an outpatient department. It was opened on May 3 by Lady Alexander.

A PASTORAL CLINICAL COURSE

FOR some time it has been felt that future clergymen, some of whom will become hospital chaplains, should during their training acquire some knowledge of conditions in hospitals, especially mental hospitals. Accordingly, in the second half of March, a pastoral clinical training-course was held at Deva Hospital, Chester, and attended by first-year and second-year theological students from St. Michael's College, Llandaff, Cardiff.

The programme included lectures on mental disorders, nursing, and related topics, with a talk on the Church's Ministry to the Sick; demonstrations of physical treatments and electro-encephalography; and visits to wards, classes, and recreational functions. The students lived in the hospital and were favourably impressed by the atmosphere there, and thought the course of great benefit. Several intend to return during the long vacation and work in the wards.

The chaplain at Deva Hospital is the Rev. N. W. J. Autton.

NUTRITION RESEARCH AT COONOOR

THE latest annual report[1] from Coonoor shows that the Nutrition Research Laboratories continue to flourish with a graduate staff of more than 30. These can be roughly divided into three groups—biochemists, clinical scientists, and public-health field workers. Biochemical studies include the following:

The vitamin-B_{12} activity of the fæces of rats was found to be almost as high when the diet contained only vegetable proteins as when skim milk was given.

In the rat there is a critical level of dietary protein necessary for the synthesis of liver enzymes (succinic acid dehydrogenase and xanthine oxidase). This is about 10% of protein in the diet. At this level an adaptive mechanism can come into play which delays the effects of protein deficiency, but 7·5% protein is clearly inadequate.

The citrogenase activity of epiphyseal cartilage from rachitic puppies has been shown to be much below normal and the old problem of how vitamin-D deficiency affects tissue metabolism is being studied.

There is also a brief account of the chemical nature of the fatty acids in butter and beef fat, which is a continuation of earlier work started long before this subject became fashionable.

The clinical scientists have been concerned mostly with protein malnutrition.

The hæmatological picture, including bone-marrow biopsy, has been studied in 18 patients with kwashiorkor. In most there was macrocytic anæmia, sometimes with a megaloblastic reaction. Improvement was usually slow even after treatment with folic acid or vitamin B_{12}.

The cystine content of the hair of children with kwashiorkor was found to be low, but the level of other amino-acids tested was normal. It is suggested that the cystine content of the hair may be a better index of the severity of protein malnutrition than the hair discoloration.

In monkeys kept on a low-protein diet for two to three months, diffuse interstitial myocardial fibrosis was found.

The public-health work has been concerned chiefly with problems of infant feeding in South India.

Detailed information about the quantities of breast-milk secreted by the mothers supplements a previous study on the quality of maternal milk.

A group of breast-fed infants received daily 2·0 g. of protein per kg. of body-weight in the first two weeks of life. This figure fell gradually to 1·4 g. after eight weeks and 1·2 g. after twenty weeks. The babies grew satisfactorily and the generally accepted figure of 3·5 g. per kg. for the protein requirements of infancy may be an over-estimate.

The attractive feature of this report is the obvious close coöperation between the biochemists, clinical scientists, and public-health workers, who are all centred on the laboratories. This is a fortunate juxtaposition seldom found elsewhere. It is now the fashion for young British graduates wishing to study abroad to look Westwards. Any unconventional young man or woman who decided to go East might be well advised to spend time at Coonoor. He would find the intellectual atmosphere in the Nilgiri Hills like the climate—bracing.

1. Nutritional Research Laboratories, Coonoor, South India: annual report, 1955–56.

University of Oxford

To commemorate the work of the late Sir Hugh Cairns a fund for neurological research is to be established. It will be administered by the Nuffield Committee for the Advancement of Medicine, and £2000 will be paid annually into the fund from the Nuffield medical benefaction to assist research in neurology and neurosurgery in the medical school.

Royal College of Obstetricians and Gynæcologists

The following were successful in a recent examination for the diploma in obstetrics:

D. A. Aitken, R. W. Allin, A. A. Allison, Andrew Armstrong, G. A. E. Baker, Vijayaratnam Balachandran, Amarendra Banerjee, A. F. Barrett, R. W. Beard, Felicity M. Bedford, Kailash Bhalla, J. T. Binless, P. M. Binns, G. C. Bird, Sybil D. Bonuini, W. M. S. Boyd, R. T. Boyle, P. V. Briffa, K. G. Buckler, Mary E. Budleigh, M. F. D. Burton, Sheelah Caldwell, D. J. C. Cameron, J. J. Camp, H. A. Campbell, P. J. S. Cannon, Gerald Caplan, J. M. Carr, B. R. T. Carroll, Leela M. Chacko, J. E. Charlewood, R. R. Charlwood, Helen Clarke, B. J. Clayton-Payne, D. J. Cliffe, D. T. Cousins, A. F. Crowley, G. H. C. Daley, S. N. Das, D. J. Davies, Edna L. Davies, W. F. T. Davies, Pauline M. Dean, H. V. Z. De Klerk, L. P. De Souza, Raymond Dingley, Pamela M. Dodson, Marion R. H. Donald, A. M. Donaldson, B. G. Dooley, R. B. Dorofaeff, B. J. Drake, R. E. Dreaper, Florence M. Duckenfield, G. H. H. Dwyer, Judith M. Edmundson, P. A. E. Edmundson, P. E. Elwood, Michael Entwisle, J. E. Evans, L. W. S. Eyears, Edith Faierman, David Fairbairn, F. G. Feinstein, Elizabeth A. Fisher, A. F. Floyd, Beryl M. Foley, H. K. Ford, E. J. H. Foster, James Frame, A. T. R. Fuller, Richard Gardner, Ethel F. E. Gelber, Srasht Kumari Ghai, Saroj Kumar Ghosh, H. R. Gibson, B. B. Giri, S. L. Goodman, C. M. Green, Everel C. Green, W. F. Griffith, Peter Griffiths, D. S. Hamilton, Julian Joseph Handler, D. C. Harris, F. A. S. Harris, Rex Harrison, D. F. Hawkins, E. S. N. Hazel, Anne Heath, Rita Henryk-Gutt, M. D. Heyman, R. F. Heys, E. P. Hilary-Jones, J. G. Hill, Molly Hill, W. G. Holland, J. A. Hopson, J. M. Hughes, Samuel Hyndman, F. L. Johnstone, Audrey Jones, F. W. Jones, R. J. B. H. Jones, J. A. Kay, Sylvia J. Keet, R. M. B. Kerr, P. J. King, J. A. Kirkland, Iris M. Krass, Dorothy K. C. Kwan, Z. K. Langdana, J. F. Leeton, Penelope A. Leighton, W. G. H. Leslie, E. H. Loxton, A. R. Lyall, H. D. MacEwan, J. A. W. McKelvey, Irene E. McLaren, Elizabeth M. McNab, I. S. McRobbie, James Maguire, Kissundath Mahabir, Dorothy Mainwaring, R. B. Malcolm, Eric Mallett, Pauline A. Manfield, B. H. Markham, Veronica Mercer, G. C. Metcalfe, J. S. B. Meyer, J. G. Millar, H. F. Molloy, P. L. C. Monier-Williams, R. M. A. Moore, Sheila M. L. Moore, Thomas Moore, J. M. Munn, Mira Vinayak Muzumdar, B. E. H. Neal, H. J. L. Nicholls, T. M. Nott-Bower, F. J. O'Connell, Mary G. Orrell, S. C. Paget, E. G. Palmer, Ponnampalam Paramaswaami, D. C. Pearson, L. J. T. Pearson, L. G. Pereira, Frances K. Philips, A. D. Prowse, P. W. Quinn, F. A. Raja, G. L. S. Rankin, M. A. H. Rayman, Edward Redfearn, K. W. Reed, B. F. Reeves, C. B. Rennick, Hilary A. Roach, T. H. Roach, T. L. Roberts, Brian Robertson, G. F. C. Rosser, A. J. Rowland, Shefali Roy, N. D. Royle, M. F. Russell, Betty V. Scott, J. A. Seddon, M. S. Shalom, C. A. Sharples, A. J. Shaw, James Smith, R. W. G. Stewart, J. S. Sugden, J. F. W. Sutherland, E. P. W. Tatford, G. A. Taylor, M. G. Taylor, M. B. Teal, Ann Thomas, D. K. M. Thomas, M. C. Thornton, Martin Tobias, Patricia A. Topham, Bhanumati Mrigendra Trivedi, Roger Unwin, Alice E. M. Van Waterschoodt, James Vernon-Parry, A. P. Walker, G. P. Walker, Edgar Wallace, R. F. Warnock, J. R. Watson, Marjory I. K. Watt, John Whewell, G. T. Whitaker, Joan W. Whitaker, Margaret White, Agnes E. Whitter, J. D. Wigdahl, I. T. D. Williams, W. A. Williamson, Mary Younie.

Royal Commission on Remuneration

The commission held a meeting in Edinburgh on May 2 for preliminary discussions with the Joint Consultants Committee (Scotland) and the Institute of Chartered Accountants in Scotland. This meeting was the eighth held by the commission.

Medico-legal Aspects of District Nursing Practice

The Queen's Institute of District Nursing is holding a conference on Wednesday, June 5, at 2.30 P.M., at Church House, Westminster, S.W.1, when Dr. J. A. Gorsky will open a discussion on this subject. Applications for tickets should reach the institute, 57, Lower Belgrave Street, S.W.1, by May 20.

Conference on Medical Records

The Association of Medical Records Officers is to hold a conference from May 16 to 19 in Brighton. Speakers will include Mr. L. E. C. Norbury, F.R.C.S., Mr. A. M. Michie, and Dr. M. P. Curwen. Further information may be had from Mr. B. B. Bonner, 11, Queensway, Horsham, Sussex.

West Midlands Physicians Association

The spring meeting of this association will be held at Holme Lacy Hospital, Hereford, on Saturday, June 1, at 11 A.M.

Institute of Dermatology, London

A semi-permanent exhibition on the xanthomatoses, by Dr. R. H. Meara, will be available at this institute, Lisle Street, W.C.2, from May 5 to 29.

London Hospital Research Building

This building, described last week (p. 928), was opened on May 1 by Mr. Dennis Vosper, the Minister of Health. It was on view to a large number of guests, who were received by Sir John Mann, chairman of the board of governors.

The Dentists and the Royal Commission

The representative board of the British Dental Association at a meeting on May 4 decided that "it would be in the best interests of both the public and the profession that they should give evidence to the Royal Commission on remuneration of doctors and dentists."

Chelsea Clinical Society

The annual dinner of this society will be held at the Rembrandt Hotel, Thurloe Place, London, S.W.7, on Tuesday, May 14, at 7.30 P.M. The guests will include Viscount Hailsham, Q.C., and Judge H. C. Leon.

United Hospitals Choir

This choir is to give a choral and orchestral concert in October, including works by Purcell, Schubert, and Handel. Rehearsals are held on Thursdays (7.30 P.M. to 10 P.M.) at the Pulteney School, Peter Street, Soho, London, W.1. Further details may be had from the secretary, Miss J. Magrath, 18, West Side, Clapham Common, S.W.4.

London Amateur Boxing Association

A meeting of the medical officers of this association (69, Victoria Street, S.W.1) is to be held at the Great Northern Hotel, King's Cross, on Wednesday, May 29, at 8 P.M., when Dr. J. H. Taylor will speak on psychiatric aspects of head injuries.

South East Metropolitan Regional Hospital Board

Dr. J. S. S. Fairley has been appointed senior administrative medical officer of the board in succession to Dr. H. L. Glyn Hughes, who is retiring.

Dr. Fairley studied medicine at the University of Cambridge and qualified in 1928, taking his M.B. two years later. After holding house-appointments at the General Hospital, Birmingham, he settled in general practice in that city. In 1938 he proceeded to the degree of M.D. As a territorial officer he was called up in 1939, and later in the war he served as D.A.D.G., Army Medical Services, at the War Office. In 1945 he was appointed assistant director of personnel to the Emergency Medical Service. Since 1947 he has been deputy senior administrative medical officer in the South East Metropolitan region.

Mental Hospitals

At their eighth annual general meeting on April 27, the Friends of Menston Hospital (near Leeds) passed a resolution calling the attention of the Minister of Health to the following "appalling admission" in the Ministry's report for 1955 (p. 123):

For it may well be that the hospital system reinforced by some inevitable stagnation during the war years, is responsible more than disease for the fact that many patients have become chronic and deteriorated.

The resolution says that "many relatives and friends who are in the grievous position of helplessly observing their patients suffering from a gradual process of deterioration, have long suspected, with deep concern and indignation, that prevailing conditions in many mental hospitals are a major contributory factor in this process. Whilst welcoming official recognition of a situation that can only be regarded as intolerable, this Association now demands an assurance from the Minister of Health that urgent steps will be taken to accelerate and extend, on a scale more commensurate with the gravity of the problem, such efforts as are at present being made for the improvement of our mental hospitals."

Sir Russell Brock, Dr. Paul Wood, and Mr. Rodney Maingot are attending the Middle East Medical Assembly in Beirut, Lebanon, from May 10 to 12, under arrangements made through the British Council.

Mr. A. S. Parkes, SC.D., F.R.S., is visiting Yugoslavia from May 5 to 25 at the invitation of the Yugoslav national commission for UNESCO and the British Council, to lecture on the work of the division of experimental biology of the National Institute for Medical Research.

Diary of the Week

MAY 12 TO 18

Sunday, 12th

KING'S COLLEGE HOSPITAL MEDICAL SCHOOL, Denmark Hill, S.E.5
10.30 A.M. Clinical meeting for general practitioners.

Monday, 13th

UNIVERSITY COLLEGE LONDON, Gower Street, W.C.1
5.30 P.M. Prof. J. B. S. Haldane, F.R.S.: Karl Pearson centenary lecture.

UNIVERSITY OF LONDON
5.30 P.M. (London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1.) Prof. Charles Huggins (Chicago): Treatment of Mammary Cancer.

ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE, 28, Portland Place, W.1
5 P.M. Prof. Philip Drinker, D.SC. (Harvard University): Air Pollution and the Public Health. (First of three Harben lectures.)

Tuesday, 14th

ROYAL COLLEGE OF PHYSICIANS OF LONDON, Pall Mall East, S.W.1
5 P.M. Prof. G. W. Pickering: Regulation of Body-temperature in Health and Disease. (First of two Croonian lectures.)

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn Fields, W.C.2
3.45 P.M. Prof. Geoffrey Hadfield: Application of Physiological Principles to Hormone-dependent Human Breast Cancer. (Imperial Cancer Research Fund lecture.)

SOCIETY OF APOTHECARIES OF LONDON, Black Friars Lane, Queen Victoria Street, E.C.4
5.30 P.M. Sir Henry Dale, O.M., F.R.S.: Medicinal Treatment—Its Aims and Results. (Gideon de Laune lecture.)

ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1
8 P.M. *Psychiatry.* Dr. Richard D. Hahn (Johns Hopkins Hospital): Treatment of General Paralysis of the Insane with Penicillin and with Penicillin Plus Malaria.

INSTITUTE OF DERMATOLOGY, Lisle Street, W.C.2
5.30 P.M. Dr. F. A. Whitlock: Neurophysiology of Itching.

ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE
5 P.M. Professor Drinker: Air Pollution and the Public Health. (Second of three Harben lectures.)

WEST END HOSPITAL FOR NEUROLOGY AND NEUROSURGERY, 91, Dean Street, W.1
5.30 P.M. Dr. D. F. Bosanquet: Neuropathology.

Wednesday, 15th

ROYAL SOCIETY OF MEDICINE
5 P.M. *Comparative Medicine.* Dr. F. Kingsley Sanders, Mr. R. F. Sellers, Mr. T. W. F. Pay: Use of Tissue-culture Methods in Virus Research.
8 P.M. *General Practice.* Dr. Hugh Sinclair: Physiology of Laughter.

POSTGRADUATE MEDICAL SCHOOL OF LONDON, Ducane Road, W.12
2 P.M. Sir Howard Florey, F.R.S.: Endothelium.

INSTITUTE OF DERMATOLOGY
5.30 P.M. Dr. Henry Haber: The Dyskeratoses.

INSTITUTE OF DISEASES OF THE CHEST, Brompton, S.W.3
5 P.M. Mr C. E. Drew: Experimental Studies of the Extracorporeal Circulation.

ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE
5 P.M. Professor Drinker: Air Pollution and the Public Health. (Third of three Harben lectures.)

ROYAL MICROSCOPICAL SOCIETY, Tavistock House South, Tavistock Square, W.C.1
5.30 P.M. Mr. H. E. Huxley, PH.D., Miss Jean Hanson, PH.D.: Studies on the Mechanism of Muscular Contraction.

UNIVERSITY OF LIVERPOOL
5.15 P.M. (Old Medical School, Liverpool.) Prof. G. Wald (Harvard University): Molecular Basis of Vision.

Thursday, 16th

ROYAL COLLEGE OF PHYSICIANS OF LONDON
5 P.M. Professor Pickering: Regulation of Body-temperature in Health and Disease. (Second of two Croonian lectures.)

ROYAL COLLEGE OF SURGEONS OF ENGLAND
3.45 P.M. Miss J. Dobson: Curiosities of Natural History. (Arnott demonstration.)

INSTITUTE OF NEUROLOGY, National Hospital, Queen Square, W.C.1
5.30 P.M. Dr. Hahn: Tabes Dorsalis, with special reference to Primary Optic Atrophy.

ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE, 26, Portland Place, W.1
7.30 P.M. Dr. C. A. Hoare, Group-Captain W. P. Stamm, Dr. R. A. Neal, Dr. G. Woolfe: Laboratory Aspects of Amœbiasis.

ALFRED ADLER MEDICAL SOCIETY
8 P.M. (11, Chandos Street, W.1.) Dr. A. Spencer Paterson: Psychopathology of Schizophrenia.

BRITISH INSTITUTE OF RADIOLOGY, 32, Welbeck Street, W.1
8.30 P.M. Mr. I. G. Williams: Rôle of Surgery and Radiotherapy in the Treatment of Breast Cancer. (Presidential address.)

MANCHESTER MEDICAL SOCIETY
8 P.M. (Staff House, University of Manchester.) *Anæsthetics.* Dr. M. Johnstone, Dr. C. W. Suckling, Dr. J. Raventos: Development of Fluothane.

Friday, 17th

ST. MARY'S HOSPITAL MEDICAL SCHOOL, Paddington, W.2
5 P.M. Mr. J. D. S. Flew: Genital Prolapse.

POSTGRADUATE MEDICAL SCHOOL OF LONDON
10 A.M. Prof. A. M. Boyd: Management of Obliterative Arteriosclerosis of the Lower Extremity.

UNIVERSITY OF DUBLIN
5 P.M. (Trinity College, Dublin.) Dr. F. B. Walsh (Johns Hopkins University): Ocular Movements associated with Regeneration of the Third Nerve. (Montgomery lecture.)

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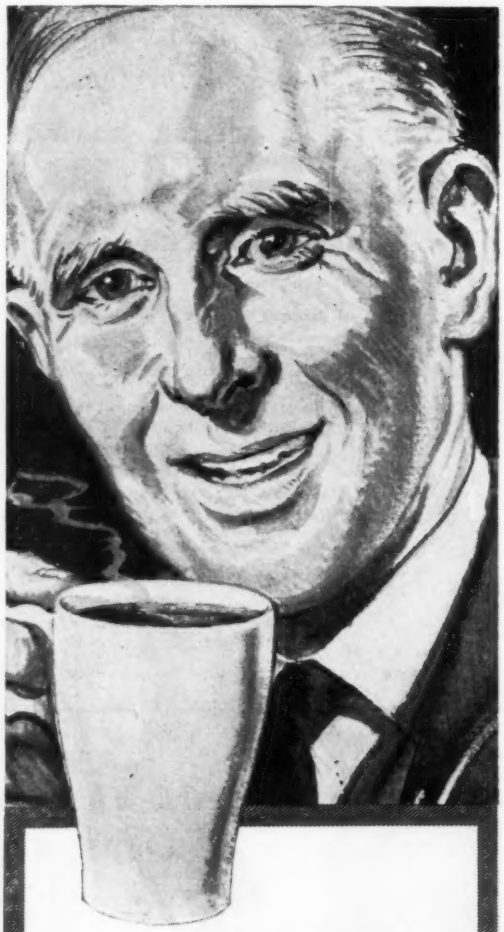

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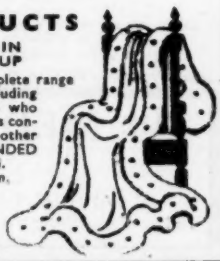

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GRESHAM COLLEGE, Basinghall-street, London, E.C.2
(Tel. : MONarch 2433)

4 LECTURES by Prof. J. L. D'SILVA, D.SC., M.R.C.P. (Gresham Professor in Physic) on "The Heart" on MONDAY–THURSDAY, 13TH MAY–16TH MAY.

The Lectures are free and begin at 5.30 P.M.

THE WRIGHT-FLEMING INSTITUTE OF MICROBIOLOGY
ST. MARY'S HOSPITAL MEDICAL SCHOOL, London, W.2

A COURSE of 4 ALMROTH WRIGHT LECTURES has been arranged for the SUMMER SESSION, 1957. The remaining Lectures will be given on the following dates in the Lecture Theatre of this Institute at 5 P.M.

Tuesday, 14th May
Dr. B. A. D. STOCKER (Lister Institute of Preventive Medicine, S.W.1) "Heritable Transformations of Bacteria."
Tuesday, 28th May
Dr. J. F. LOUTIT (Atomic Energy Research Establishment, Harwell) "The Immune Response following X-Irradiation."
Tuesday, 4th June
Dr. R. M. FRY (Public Health Laboratory, Cambridge) "The Spread of Infections in Hospitals and Institutions."

These Lectures are open to all members of the Medical Profession and to all Students in Medical Schools without fee.

THE MIDDLESEX HOSPITAL MEDICAL SCHOOL

LEVERHULME RESEARCH SCHOLARSHIP IN CLINICAL MEDICINE

Applications are invited for a Leverhulme Research Scholarship, value £1000 p.a., plus superannuation. The Scholarship shall be for 1 year in the first instance. The scholar must satisfy the Middlesex Hospital Medical School that the major part of his time will be spent in research, but he may be allowed to hold other appointments. The work may be related to any branch of medicine, must be essentially clinical and will be carried out in the Institute of Clinical Research attached to the Middlesex Hospital Medical School.

Applications, with the names of 2 referees, and a summary of the proposed work should reach the Secretary of the Institute of Clinical Research, The Middlesex Hospital Medical School, 40, Hanson-street, London, W.1, not later than 7th June, 1957.

THE UNIVERSITY OF LEEDS

PART-TIME COURSE FOR THE DIPLOMA IN PUBLIC HEALTH

A Course for the Diploma in Public Health will commence in OCTOBER, 1957. Instruction will be part-time and will occupy 5 academic terms. Candidates holding part-time Public Health appointments or with previous whole-time Public Health service may be granted exemption from some of the practical Public Health work, so reducing the whole-time study to approximately 2 days a week.

Candidates are asked to apply as soon as possible to the Secretary, School of Medicine, Thoresby-place, Leeds, 2.

POSTGRADUATE COURSE IN INDUSTRIAL OPHTHALMOLOGY
To be held at the BIRMINGHAM AND MIDLAND EYE HOSPITAL
23RD–27TH SEPTEMBER, 1957

The course is for Ophthalmologists and Industrial Medical Officers, but is open for all medical practitioners. It will include clinical demonstrations, lectures on industrial diseases and injuries, also visits to local factories and to the Burns Unit of the Birmingham Accident Hospital.

Fee : £5 5s. for the full course.
£2 12s. 6d. for morning sessions only.

Syllabus can be obtained from the Secretary, Industrial Ophthalmology Course, Birmingham and Midland Eye Hospital, Church-street, Birmingham, 3.

TANCRED'S STUDENTSHIPS
DIVINITY : MEDICINE : LAW

£100 p.a. each. For Men only

The Governors and Trustees of Tancred's Foundation propose to make their annual election of a Student in Physic at Gonville and Caius College, Cambridge, on the result of the Entrance Examination to be held in JANUARY, 1958, required from candidates for admission to Gonville and Caius College, Cambridge, who intend to read medicine.

Candidates must have been born in England, Scotland or Wales and be members of the Church of England and unmarried. Candidates must be within the ages of 17 years and 22 years on 1st October, 1958. The last day for sending in Petitions is 1st July, 1957.

Further announcements relating to the Divinity and Law Studentships awarded by this Foundation will appear in September, 1957, and February, 1958.

Apply for further particulars and form of Petition stating kind of Studentship and mentioning this paper to the Clerk, R. M. C. HOWARD, Esq., D.S.O., 28, Lincoln's Inn-fields, London, W.C.2.

NAPT

SYMPOSIUM ON CHRONIC BRONCHITIS, WEDNESDAY, 29TH MAY, 1957, 3.30–6.30 P.M., Clinical Science Building, York-place, Manchester.

Admission by ticket only, 10s. each (including afternoon tea and sherry), from National Association for the Prevention of Tuberculosis, Tavistock House North, London, W.C.1.

L.M.S.S.A.

FINAL EXAMINATION : SURGERY, 11th June, 8th July, 12th August, 1957. MEDICINE, PATHOLOGY, 17th June, 15th July, 19th August, 1957. MIDWIFERY, 18th June, 16th July, 20th August, 1957. MASTERY OF MIDWIFERY, May and November. DIPLOMA IN INDUSTRIAL HEALTH, July and December.

For regulations apply REGISTRAR, Apothecaries Hall, Black Friars-lane, London, E.C.4.

ST. MARY'S HOSPITAL MEDICAL SCHOOL (University OF LONDON), Paddington, W.2. Applications are invited for 2 POSTGRADUATE RESEARCH FELLOWSHIPS at the rate of £500 for 1 year, which may be held in any Pre-medical, Pre-clinical or Clinical Department of the Medical School. Applicants must be medically qualified, or hold an Honours Degree in Science, and should have completed their national service. The duties will consist of whole-time research under the Head of the Department concerned.

Applications (in duplicate), stating age, qualifications, experience and a brief outline of the research work proposed, together with the names of 2 referees, should be received by the Secretary not later than 1st June, 1957.

OXFORD UNIVERSITY. Applications are invited for the post of Full-time CLINICAL TUTOR IN OPHTHALMOLOGY. The appointment is for 2 years in the first instance and is renewable ; the salary is £1600 p.a. plus F.S.S.U. and children's allowances. The salary will be increased in the current revision of university salaries. The successful candidate will be responsible for teaching ophthalmology in the University Medical School and a considerable part of his time will be free for research. The candidate may hold the honorary post of First Assistant in the Oxford Eye Hospital. He will be required to take up office on 1st August, 1957, or as soon as possible thereafter.

Applications, together with the names of 2 referees, should be sent by 1st June, 1957, to the Secretary, Nuffield Laboratory of Ophthalmology, Walton-street, Oxford.

UNIVERSITY OF LONDON. The Senate invite applications for the CHAIR OF BACTERIOLOGY tenable at St. George's Hospital Medical School (present salary within the range £2350–£2850 a year, but under revision).

Applications (10 copies) must be received not later than 12th June, 1957, by the Academic Registrar, University of London, Senate House, W.C.1, from whom further particulars may be obtained.

UNIVERSITY OF DUBLIN. Trinity College. Applications are invited for the post of ASSISTANT LECTURER IN ANATOMY (salary £650–£50–£750).

Further information may be obtained from the Registrar, Trinity College, Dublin, who will accept applications until 15th June, 1957.

UNIVERSITY OF CAPE TOWN, South Africa. Applications are invited for the post of Grade I TECHNICIAN IN PHYSIOLOGY. The successful candidate will be in charge of the experimental laboratories. Applicants should have experience in the maintenance of physiological apparatus and in the care of laboratory animals. Experience in building and maintaining electronic equipment will be an advantage. The salary scale is £750–£50–£900 p.a. plus a temporary cost-of-living allowance for a married man (at present £234 p.a.).

Applications, with copies of testimonials, should state age, qualifications and experience and should give the names of 2 referees whom the University may consult. 2 copies of the application should reach the Secretary, Association of Universities of the British Commonwealth, 36, Gordon-square, London, W.C.1 (from whom a memorandum giving the general conditions of appointment should be obtained), by 31st May, 1957. 1 further copy of the application should be sent at the same time by air-mail to the Registrar, University of Cape Town, Private Bag, Rondebosch, Cape Town.

The University reserves the right to appoint a person other than one of the applicants or to make no appointment.

Hospital Services : Senior Appointments

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD invites applications for the post of DEPUTY SENIOR ADMINISTRATIVE MEDICAL OFFICER at an inclusive salary of £1900 p.a., rising by annual increments of £100 to £2400. Candidates should be well qualified and clinically experienced with considerable knowledge and practice of administrative medicine. The appointment is superannuable and terminable by 3 months notice from either party.

Applications, stating age, qualifications and experience, together with names and addresses of 3 referees, should reach the Chairman at 11, Portland-place, by 25th May, 1957.

ST. GEORGE'S HOSPITAL, S.W.1. Applications are invited for the post of CONSULTANT PHYSICIAN to the Hospital. Candidates must be Fellows or Members of the Royal College of Physicians of London. Remuneration and conditions of service will be those applicable to part-time Consultant staff under the National Health Service. The approximate number of half-days service required will be 5 per week. The main duties in this post will be in general medicine. They will include responsibility for patients suffering from chest disease, and the care of beds at the Grove Hospital, Tooting.

Applications, stating age, qualifications, and experience, should be sent to the undersigned not later than 8th June, 1957.

P. H. CONSTABLE, House Governor.

BIRMINGHAM REGIONAL HOSPITAL BOARD. Royal HOSPITAL, WOLVERHAMPTON. Whole-time CONSULTANT PATHOLOGIST. Please note for post advertised in April 27th issue closing date for applications should have read 27th May, 1957.

CROYDON. GENERAL HOSPITAL. (200 Beds.) Croydon GROUP HOSPITAL MANAGEMENT COMMITTEE. Locum Tenens CONSULTANT or SENIOR HOSPITAL MEDICAL OFFICER RADIOLOGIST (whole-time or maximum part-time), 26th June–12th July and 9th August–6th September.

Applications in writing to—

GEORGE A. PAINES, Group Secretary,
Hospital Management Committee.

General Hospital, London-road, Croydon, Surrey.

CROYDON. MAYDAY HOSPITAL. (611 Beds.) Croydon GROUP HOSPITAL MANAGEMENT COMMITTEE. Locum Tenens CONSULTANT OBSTETRICIAN AND GYNÆCOLOGIST (whole-time or maximum part-time), 29th July–8th September.

Applications in writing to—

GEORGE A. PAINES, Group Secretary,
Hospital Management Committee.

General Hospital, London-road, Croydon, Surrey.

LIVERPOOL REGIONAL HOSPITAL BOARD. Alder HEY CHILDREN'S HOSPITAL. Applications are invited for the post of CONSULTANT CHILD PSYCHIATRIST either whole-time or on maximum part-time sessions. Duties will be mainly at the above hospital, but will include visits to Child Psychiatric Clinics in other parts of the Region. The Child Psychiatric Department at Alder Hey is closely associated with the University Department of Child Health which is sited at the hospital, and clinical instruction in Child Psychiatry for undergraduates is undertaken at the Unit. Facilities could be made available for research if desired. Applicants should possess the D.P.M. and have had considerable child psychiatric experience including practical knowledge of outpatient work. Possession of a higher qualification in general medicine will be considered an advantage.

Forms of application from Dr. T. Lloyd Hughes, Senior Administrative Medical Officer, Liverpool Regional Hospital Board, 19, James-street, Liverpool, 2, to be returned not later than 1st June, 1957.

VINCENT COLLINGE, Secretary to the Board.

LIVERPOOL REGIONAL HOSPITAL BOARD. Applications are invited for the post of CONSULTANT ANÆSTHETIST (whole-time or maximum part-time sessions) with duties mainly in the North Liverpool area. Candidates must have had at least 5 years recognised training and experience in anæsthesia, and must be Fellows of the Faculty of Anæsthetists or already hold a Consultant post.

Forms of application from Dr. T. Lloyd Hughes, Senior Administrative Medical Officer, Liverpool Regional Hospital Board, 19, James-street, Liverpool, 2, to be returned not later than 1st June, 1957.

VINCENT COLLINGE, Secretary to the Board.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time SENIOR ASSISTANT PSYCHIATRIST required for Middlewood Hospital, Sheffield. Salary scale £1575–£50–£2025.

Application forms and further details from Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield. Forms to be returned by 1st June, 1957.

SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time CONSULTANT PATHOLOGIST-IN-CHARGE required for hospitals in the Grimsby Area.

Application forms and further details from Senior Administrative Medical Officer, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield. Forms to be returned by 8th June, 1957.

LEEDS REGIONAL HOSPITAL BOARD.

Whole-time or maximum Part-time CONSULTANT in Child Psychiatry for the York, Scarborough and Harrogate areas. The main duties will be in association with the York, North Riding and West Riding Education Committees. The person appointed will be based on York and will spend approximately 1 day each week at Scarborough and Harrogate.

Whole-time CONSULTANT in Psychiatry at Broadgate Hospital, Beverley (650 Beds). Option for maximum part-time service will be considered after 3 years. The person appointed will undertake extramural duties including outpatient work at the General Hospital, Driffield, and Kingston General Hospital, Hull. House available.

Whole-time ASSISTANT PSYCHIATRISTS (Senior Hospital Medical Officer scale).

(i) Storthes Hall Hospital, Kirkburton, near Huddersfield (2680 Beds), and associated clinics at general hospitals. Resident or non-resident. A large modern flat is available if required and accommodation is also available for a single person.

(ii) Clifton Hospital, York (1112 Beds), and associated clinics at Harrogate York and Scarborough. The person appointed may also have duties at Claypenny Hospital for Mental Defectives (1 session per week). Small flat available.

Applicants for any of the appointments should hold the D.P.M. or other equivalent qualification.

Applications (12 copies), stating age, qualifications and details of present and previous appointments with dates, and names and addresses of 3 referees, to the Secretary, Park-parade, Harrogate, by 27th May, 1957.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of Whole-time ASSISTANT RADIOLOGIST based at the Dumfries and Galloway Royal Infirmary. Salary (at age 32 and over) on the scale £1575–£50–£2025. This appointment is subject to the National Health Service (Scotland) superannuation regulations.

Applications (16 copies), stating date of birth, qualifications, experience, present appointment, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, C.2, not later than 30 days after the publication of this advertisement.

SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the whole-time post of CONSULTANT PSYCHIATRIST AND RESIDENT PHYSICIAN-SUPERINTENDENT at St. Francis Hospital, Haywards Heath, Sussex, incorporating the Neuropsychiatric Unit of Hurstwood Park Hospital. The successful applicant will be required to occupy the house available and take up duties on 1st October, 1957. Candidates should possess a D.P.M. and preferably a higher qualification; psychiatric hospital and out-patient clinic experience is essential, and candidates should have had experience in modern psychiatric therapeutic procedures, including psychotherapy and occupational therapy. Applicants may visit the Hospital.

Apply, stating nationality, age, sex, qualifications and experience, including details of present appointment and of war service, together with the names and addresses of 3 referees, to the Secretary, Advisory Appointments Committee, South East Metropolitan Regional Hospital Board, 11, Portland-place, W.1, not later than 25th May, 1957.

WELSH REGIONAL HOSPITAL BOARD. Whole-time Locum Tenens CONSULTANT (general medicine) required Merthyr and Aberdare Hospital Management Committee area, 3rd–24th August, 1957.

Applications, naming 2 referees, to Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff.

WELSH REGIONAL HOSPITAL BOARD. Whole-time Locum Tenens CONSULTANT PATHOLOGIST required Merthyr and Aberdare area immediately for approximately 3 months.

Applications, naming 2 referees, to Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff.

Hospital Services : Junior Appointments

ALBERT DOCK ORTHOPÆDIC AND FRACTURE HOSPITAL, Alnwick-road, E.16. SEAMEN'S HOSPITALS GROUP. SENIOR HOUSE OFFICER for Receiving Room duties required on 13th May. Post, which is normally resident, is recognised by the Royal College of Surgeons, and provides excellent experience in a wide variety of traumatic conditions received from the adjacent dockland and from shipping in the Port of London. Salary £819 10s.

Applications, stating age, nationality, qualifications and experience, with the names of 2 recent referees, should be sent to the Secretary, Dreadnought Seamen's Hospital, Greenwich, S.E.10, immediately.

CONNAUGHT HOSPITAL, Walthamstow, E.17. (118 Beds.) Applications are invited for the post of CASUALTY OFFICER AND DEPUTY RESIDENT SURGICAL OFFICER graded as Senior House Officer, vacant 26th May, 1957. Recognised for F.R.C.S. Salary £819 10s. p.a., less £150 p.a. for board, lodging, &c.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Hospital Management Committee, Forest Group, Langthorne-road, E.11.

CONNAUGHT HOSPITAL, Walthamstow, E.17. (118 Beds.) HOUSE SURGEON required for 6 months (General Surgery and Special Departments). Recognised for F.R.C.S.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Hospital Management Committee, Forest Group, Langthorne-road, E.11.

CENTRAL MIDDLESEX HOSPITAL, Park Royal, N.W.10. RESIDENT HOUSE OFFICER required in Gastroenterological Department. Appointment from 1st June, 1957. Pre-registration candidates only will be considered.

Applications, with copies of 2 testimonials, to Medical Director by 18th May.

CENTRAL MIDDLESEX HOSPITAL, Park Royal, N.W.10. RESIDENT SENIOR HOUSE OFFICER required for Casualty Department. Successful candidate will work under supervision of Orthopædic and Traumatic Specialist. Appointment for 6 months from 18th June, 1957.

Applications, with names of 2 referees or copies of 2 testimonials, to Medical Director by 18th May.

DREADNOUGHT SEAMEN'S HOSPITAL, Greenwich, S.E.10. HOUSE SURGEON (pre-registration) required immediately.

Applications, stating age, nationality, qualifications and experience and giving the names of 3 recent referees, should be sent to the Secretary on or before 16th May.

ELIZABETH GARRETT ANDERSON HOSPITAL, Euston-road, N.W.1. (ROYAL FREE HOSPITAL GROUP.) Applications are invited from pre-registration and registered Women medical practitioners for the post of FIRST HOUSE SURGEON, with charge of general surgical beds. Appointment for 6 months from 1st June, 1957. Salary according to Ministry of Health scale for House Officers.

Applications, with copies of 3 recent testimonials, should be sent to the Secretary, Elizabeth Garrett Anderson Hospital, by 15th May, 1957.

ELIZABETH GARRETT ANDERSON HOSPITAL, Euston-road, N.W.1. (ROYAL FREE HOSPITAL GROUP.) Applications are invited from pre-registration and registered Women medical practitioners for the post of SECOND HOUSE SURGEON. Appointment for 6 months from 1st July, 1957. Salary according to Ministry of Health scale for House Officers.

Applications, with copies of 3 recent testimonials, should be sent to the Secretary, Elizabeth Garrett Anderson Hospital, by 22nd May, 1957.

ELIZABETH GARRETT ANDERSON HOSPITAL, Euston-road, N.W.1. (ROYAL FREE HOSPITAL GROUP.) Applications are invited from pre-registration and registered Women medical practitioners for the post of OBSTETRIC HOUSE SURGEON (recognised for the M.R.C.O.G.). Duties to commence 1st July, 1957. Appointment for 6 months. Salary in accordance with Ministry of Health scale for House Officers.

Applications, with copies of 3 recent testimonials, should be sent to the Secretary, Elizabeth Garrett Anderson Hospital, by 22nd May, 1957.

GERMAN HOSPITAL, London, E.8. (General—157 Beds.) Applications are invited for the 6 months resident appointment of Pre-registration HOUSE SURGEON, now vacant, and should be sent to the Group Secretary, Hackney Hospital, London, E.9, quoting GH/PHS.

GUY'S HOSPITAL, S.E.1, and SOUTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited to fill an established vacancy as SENIOR REGISTRAR in Psychological Medicine until 30th September, 1958. The appointment will be made jointly by the bodies concerned and will be held in the first instance until 30th September, 1957, in the Regional Hospital in the Bexley Group, and will be renewable for 1 year commencing 1st October, 1957, at Guy's Hospital until 30th September, 1958. Duties will commence as soon as possible after 1st June, 1957, in the Bexley Group. The appointment will be in accordance with the terms and conditions of service of hospital medical and dental staffs (England and Wales).

Forms of application are obtainable from, and should be lodged with, the Superintendent, Guy's Hospital, London Bridge, S.E.1, not later than 17th May, 1957.

HAMMERSMITH HOSPITAL AND POSTGRADUATE MEDICAL SCHOOL AND NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Joint appointment. Whole-time REGISTRAR (orthopædics) required 1st August. Appointment tenable for 3 years, of which 2 will be spent at Hammersmith Hospital and the Postgraduate Medical School of London studying orthopædic and traumatic surgery and 1 year (resident if required) at Heatherwood Hospital, Ascot, studying long-term orthopædic surgery.

Applications, stating age, qualifications, experience, names of 2 referees, to Secretary, Board of Governors, by 27th May.

HORNSEY CENTRAL HOSPITAL, Park-road, N.8. ARCHWAY GROUP HOSPITAL MANAGEMENT COMMITTEE. RESIDENT MEDICAL OFFICER (Senior House Officer grade) to assist the part-time Consultant staff required at above Hospital. Post offers good general experience (medicine and surgery) and would be beneficial to a fully registered Doctor intending to go into general practice and one reading for higher qualifications. The Hospital may be visited by direct arrangement.

Application forms obtainable from, and returnable to, the Group Secretary, 46, Cholmeley-park, Highgate, N.6, by 20th May, 1957.

HOSPITAL OF ST. JOHN AND ST. ELIZABETH, 60, Grove End-road, London, N.W.8. Required, Part-time MEDICAL REGISTRAR (Male). The possession of the Membership of the Royal College of Physicians of London is desirable. Honorarium at the rate of £200 p.a.

Further particulars may be obtained from the Secretary to whom applications, with names of 3 referees, should be sent on or before Thursday, 16th May, 1957.

METROPOLITAN HOSPITAL, Kingsland-road, London, E.8. Applications are invited from registered medical practitioners for the post of RESIDENT SENIOR HOUSE OFFICER (Anæsthetist). The post is recognised for the F.F.A.R.C.S.

Apply, stating nationality, qualifications and experience, together with 2 testimonials, to the Hospital Secretary.

LAMBETH HOSPITAL, Brook-drive, S.E.11. Applications are invited from pre-registration and registered medical practitioners for the post of RESIDENT HOUSE SURGEON, vacant from 5th June, 1957. The successful candidate will be required to carry out a fortnight's locum duty from 22nd May, 1957. The position is recognised for registration and for the F.R.C.S.

Application forms from the acting Physician-Superintendent.

LONDON HOSPITAL, Whitechapel, E.1. Applications are invited for the post of REGISTRAR to the Department of Psychiatry becoming vacant on 27th June, 1957. A higher qualification, although desirable, is not essential.

Applications (12 copies), giving the names and addresses of 3 referees, should be received by the undersigned by 30th May, 1957. H. BRIERLEY, House Governor.

MIDDLESEX HOSPITAL, W.1. Applications invited from fully registered candidates for the following posts vacant 1st August.

SENIOR RESIDENT ASSISTANT ANÆSTHETIST (graded as Senior House Officer).

JUNIOR RESIDENT ASSISTANT ANÆSTHETIST (graded as House Officer).

Forms of application, obtainable from Deputy Superintendent, should be returned, naming 2 referees, by 31st May.

MILE END HOSPITAL, Bancroft-road, London, E.1. (484 Beds—obstetric beds 69; gynæcological beds 31.) Applications are invited for 2 posts of HOUSE SURGEON (post-registration), obstetrics and gynæcology. Posts recognised in obstetrics for M.R.C.O.G. Vacancy (*a*) 7th June, 1957, (*b*) 18th August, 1957.

Application forms, obtainable from Physician-Superintendent, to be returned by 24th May, 1957, with copies of not more than 3 testimonials.

NATIONAL HEART HOSPITAL, Westmoreland-street, W.1 (with which is associated the Institute of Cardiology). The Board of Governors invites applications to fill a vacancy, as from 1st June, 1957, in the post of REGISTRAR. Applicants should have been fully trained in general medicine and should possess a higher medical qualification. Opportunities for research available.

Applications, with copies of 3 recent testimonials, should be sent to me not later than Saturday, 25th May, 1957.

ROBERT G. E. WHITNEY, Secretary to the Board.

NATIONAL HOSPITALS FOR NERVOUS DISEASES. NEUROSURGICAL DEPARTMENT. The resident post of REGISTRAR in Neurosurgery (Registrar grade) at the Maida Vale Hospital for Nervous Diseases, London, W.9, will become vacant on 17th June, 1957.

Applications, together with the names of 2 referees, should be sent to the Secretary, Maida Vale Hospital, W.9, not later than 30th May, 1957.

NELSON HOSPITAL, Kingston-road, Merton, S.W.20. RESIDENT ANÆSTHETIST (Senior House Officer grade), with responsibility for a small children's ward. Post recognised for D.A. Vacant now.

Applications, stating age, qualifications and experience, with copies of testimonials and the name of 1 referee, should be sent to the Group Secretary, St. Helier Hospital, Carshalton, Surrey.

NELSON HOSPITAL, Kingston-road, Merton, S.W.20. HOUSE SURGEON (resident), vacant now. Post recognised for F.R.C.S.

Applications, stating age, qualifications, &c., with the names and addresses of 2 referees, should be sent to the Secretary at above address.

NORTH EAST METROPOLITAN REGIONAL HOSPITAL BOARD.

ORTHOPÆDIC REGISTRAR (resident), St. Andrew's Hospital, Billericay, Essex. Recognised for F.R.C.S.

REGISTRAR in Orthopædic and General Surgery (resident), Metropolitan Hospital, E.8. Candidates must hold F.R.C.S.

REGISTRAR in Obstetrics and Gynæcology (resident), East End Maternity Hospital, E.1.

REGISTRAR in Obstetrics and Gynæcology (resident), Bethnal Green Hospital, E.2.

MEDICAL REGISTRAR (resident), St. Leonard's Hospital, N.1.

REGISTRAR in Mental Deficiency (non-resident—but staff cottage available), South Ockendon Hospital, near Romford, Essex.

PSYCHIATRIC REGISTRAR (resident, if single; non-resident, if married), Runwell Hospital, near Wickford, Essex.

PSYCHIATRIC REGISTRAR (resident or non-resident, single accommodation available), Severalls Hospital, Colchester, Essex.

Appointments subject to review after 1 year.

Application forms from Secretary, 11A, Portland-place, W.1, to be returned by 25th May, 1957.

PADDINGTON GENERAL HOSPITAL, Harrow-road, W.9. (582 Beds.) Applications are invited to fill the post, commencing 1st July, 1957, of SENIOR HOUSE OFFICER (casualty), resident on duty (1 of 3). Recognised for F.R.C.S.

Applications, stating age, experience, qualifications, together with names and addresses of 2 referees, to be sent to Hospital Secretary by 27th May.

PADDINGTON GENERAL HOSPITAL, Harrow-road, W.9 (582 Beds), ST. CHARLES' HOSPITAL, Ladbroke-grove, W.10 (575 Beds). Applications are invited for the posts, available mid-July, of 2 SENIOR HOUSE OFFICER PATHOLOGISTS (1 for each Hospital). Fully resident or resident when on duty. The Laboratory is recognised for the examination for the Diploma of Pathology. Further details obtainable from Director of Laboratory, Paddington General Hospital.

Applications, stating age, qualifications and experience together with names and addresses of 2 referees, to Secretary to Committee, Paddington Group Hospital Management Committee, Harrow-road, W.9, by 27th May.

POPLAR HOSPITAL, East India Dock-road, E.14. HOUSE SURGEONS (2). Pre-registration posts commencing on 1st June, 1957. Duties include inpatient and outpatient work. Recognised for F.R.C.S.

Applications, with copy of at least 1 testimonial, should be sent to Hospital Secretary immediately.

QUEEN MARY'S HOSPITAL FOR THE EAST END, Stratford, E.15. HOUSE SURGEON (pre-registration) for 6 months commencing 15th June, 1957. Post recognised for F.R.C.S.

Applications, with 2 recent testimonials, to Hospital Secretary by 24th May, 1957.

QUEEN MARY'S HOSPITAL FOR THE EAST END, Stratford, E.15. HOUSE SURGEON (Male or Female) (House Officer third post). 6 months commencing as soon as possible. Post recognised for F.R.C.S.

Applications, with the names of 3 referees, to Hospital Secretary by 25th May, 1957.

ROYAL FREE HOSPITAL. Applications are invited for the post of SENIOR REGISTRAR to the Infectious Diseases Department of the Royal Free Hospital, duties to commence 1st July, 1957. The appointment is for 1 year in the first instance. Candidates should be registered medical practitioners, hold a higher degree and have had experience of infectious diseases.

Formal application giving details of experience &c., together with the names of 3 referees, should be sent to the Secretary to the Board of Governors, Royal Free Hospital, Gray's Inn-road, London, W.C.1, not later than 1st June, 1957.

ROYAL NATIONAL ORTHOPÆDIC HOSPITAL, 234, Great Portland-street, London, W.1. Applications are invited for the appointment of ORTHOPÆDIC REGISTRAR (full-time), non-resident. Preference will be given to candidates with a higher surgical qualification.

Applications to be received not later than 25th May, 1957. Forms of application can be obtained from the House Governor at 234, Great Portland-street, London, W.1.

SOUTH EAST REGIONAL THORACIC SURGERY UNIT. (50 Beds.) BROOK GENERAL HOSPITAL, Shooters Hill-road, S.E.18. SENIOR HOUSE OFFICER, vacant now. Recognised for F.R.C.S. 6 months appointment and may then be renewed for a further period. The Unit treats all types of chest diseases and offers opportunity for comprehensive training in thoracic surgery.

Apply to Group Secretary, Memorial Hospital, Woolwich, S.E.18.

SOUTH WESTERN HOSPITAL, Landor-road, S.W.9. HOUSE PHYSICIAN (registered or pre-registration) required at the above Hospital. Combined tuberculosis and acute medicine. Post vacant 21st June, 1957.

Form of application from the Secretary, to be returned by 18th May, 1957.

ST. ANN'S GENERAL HOSPITAL, N.15. Applications are invited from registered medical practitioners for the appointment of RESIDENT HOUSE PHYSICIAN (Senior House Officer) to Pædiatric and Infectious Diseases Department at above Hospital for a period of 6 months from 18th June, 1957.

Application form from Secretary, Tottenham Group Hospital Management Committee, The Green, N.15, to be returned by 25th May, 1957.

ST. BARTHOLOMEW'S HOSPITAL, E.C.1. Applications are invited for the post of SURGICAL CASUALTY REGISTRAR for a period of 1 year with possible re-election up to 2 years. The post is recognised for the F.R.C.S. and is tenable from 1st July, 1957.

Applications, together with the names of 2 referees, should be submitted to the undersigned on or before 26th May, 1957.

C. C. CARUS-WILSON, Clerk to the Governors.

ST. CHARLES' HOSPITAL, Ladbroke-grove, W.10. (575 Beds.) Applications are invited to fill the post of SENIOR HOUSE OFFICER (tuberculosis).

Applications, stating age, qualifications, experience, together with the names and addresses of 2 referees, to be forwarded to Hospital Secretary immediately.

ST. CLEMENT'S HOSPITAL, Bow, E.3. House Physician (not pre-registration) for general medical wards. Post vacant 22nd May, 1957.

Applications, with the names and addresses of 2 referees, to be sent to Hospital Secretary immediately.

ST. MARY'S HOSPITAL, W.2. Diagnostic Radiological DEPARTMENT. Applications are invited for a POSTGRADUATE TRAINEESHIP from persons intending to take the D.M.R.D. Course in London, October, 1957–1959. The possession of a higher qualification would be advantageous. The successful candidate will be required to take up his duties on 1st October, 1957. The appointment will be for 1 year, renewable for a second year, and will be remunerated at Senior House Officer rates.

Applications, stating nationality, date of birth, permanent address, qualifications with dates, details and National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should reach ALAN POWDITCH, House Governor, not later than 25th May, 1957.

ST. MARY'S HOSPITAL, Paddington, W.2. Applications are invited from suitably qualified practitioners for the post of NON-RESIDENT CASUALTY SURGEON. Candidates must have held an appointment as House Surgeon at this Hospital or at another hospital approved by the Board of Governors. The appointment is for a first period of 6 months, with effect from 1st July, 1957; remuneration to be at Senior House Officer rates.

Applications, stating nationality, date of birth, permanent address, qualifications with dates, details and National Health Service gradings of previous and present appointments, together with the names and addresses of 3 referees, should reach ALAN POWDITCH, House Governor, not later than 28th May, 1957.

ST. MARY'S HOSPITAL, Paddington, W.2, AND THE NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. SENIOR REGISTRAR in General Surgery required on 1st September, 1957, for a combined appointment. The first and final years at St. Mary's Hospital and the intervening years at either Ashford, Paddington or West Middlesex Hospitals. Possession of higher surgical qualification essential. Hospitals may be visited by direct appointment.

Application forms, which may be obtained from ALAN POWDITCH, House Governor, must be returned not later than 21st May, 1957.

ST. MARY'S HOSPITAL, Paddington, W.2, AND THE NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the appointment of SENIOR REGISTRAR in General Medicine (2 vacancies), with effect from 1st October, 1957, for combined appointments. The first 2 years will be at Ashford or West Middlesex Hospitals and the final 2 years at St. Mary's Hospital. Possession of higher medical qualification essential. Hospitals may be visited by direct appointment.

Application forms, which may be obtained from ALAN POWDITCH, House Governor, must be returned not later than 28th May, 1957.

ST. JAMES' HOSPITAL, Balham, London, S.W.12. HOUSE PHYSICIAN (pædiatric), vacant 10th June. Post recognised for D.C.H. Applicant will also be required to assist in the Department of Pathology.

Applications, stating age, qualifications, experience and names of 2 referees, to Group Secretary, Wandsworth Hospital Group, at above address, by 25th May. (0306.)

ST. JAMES' HOSPITAL, Balham, London, S.W.12. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. ANÆSTHETIC REGISTRAR. Post recognised for D.A. and F.F.A.R.C.S.

Application forms obtainable from Group Secretary, Wandsworth Hospital Group, at above address, to be completed and returned by 1st June. (0307.)

ST. JOHN'S HOSPITAL FOR DISEASES OF THE SKIN, Lisle-street, Leicester-square, London, W.C.2. Applications are invited for the post of RESIDENT SENIOR HOUSE OFFICER for the Inpatient Department, vacant 1st August, 1957.

Applications, naming 2 referees, to the Secretary to the Board of Governors, by 25th May, 1957.

ST. TERESA'S MATERNITY HOSPITAL, The Downs, Wimbledon, S.W.20. (56 Beds.) Applications are invited from fully registered medical practitioners for the appointment of RESIDENT OBSTETRIC HOUSE OFFICER for 6 months in the first instance, commencing 12th June. Salary £467 10s.–£819 10s. p.a., according to experience. Emoluments deducted according to usual scale. Self-contained flat available in the Hospital grounds. Preference will be given to candidates who have previous obstetric experience.

Applications, stating age, qualifications, nationality, and experience, and 3 recent testimonials, to the Medical Secretary.

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.1. There will be a vacancy on 8th October, 1957, for a RESIDENT SENIOR DENTAL HOUSE SURGEON. The post is recognised for the Fellowship in Dental Surgery, Royal College of Surgeons. Experience is given in both oral surgery and orthodontics.

Further particulars and form of application, which must be returned not later than 10th June, 1957, are obtainable from the undersigned.

H. F. RUTHERFORD, House Governor and Secretary.

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.1. There will be vacancies for the following Senior House Officers on 15th October, 1957 :—

1 HOUSE PHYSICIAN.
1 HOUSE SURGEON.

Further particulars and form of application, which must be returned not later than Monday, 10th June, 1957, are obtainable from the undersigned.

H. F. RUTHERFORD, House Governor and Secretary.

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.1. There will be a vacancy on 7th September, 1957, for an ASSISTANT RESIDENT MEDICAL OFFICER (grade—Senior House Officer) at the Country Branch Hospital, Tadworth, Surrey (101 Beds).

Further particulars and form of application, which must be returned not later than Monday, 10th June, 1957, are obtainable from the undersigned.

H. F. RUTHERFORD, House Governor and Secretary.

THE HOSPITAL FOR SICK CHILDREN, Great Ormond-street, London, W.C.1. There will be a vacancy on 1st November, 1957, for a RESIDENT OFFICER to the Neurological and Neuro-surgical Department (Senior House Officer).

Further particulars and form of application, which must be returned not later than Monday, 10th June, 1957, may be obtained from the undersigned.

H. F. RUTHERFORD, House Governor and Secretary.

WANSTEAD HOSPITAL, Hermon Hill, London, E.11. (191 Beds.) HOUSE SURGEON required. Post vacant 28th May, 1957. Recognised for F.R.C.S.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Forest Group Hospital Management Committee, Langthorne-road, E.11.

WANSTEAD HOSPITAL, Hermon Hill, E.11. (191 Beds.) Applications are invited for the post of CASUALTY OFFICER (recognised for F.R.C.S.), graded Senior House Officer, vacant 22nd June, 1957. Salary £819 10s. p.a., less £150 p.a. for board, lodging, &c.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Forest Group Hospital Management Committee, Langthorne-road, E.11.

WANSTEAD HOSPITAL, Hermon Hill, E.11. (191 Beds.) Applications are invited for the post of SENIOR (RESIDENT) HOUSE OFFICER. Salary £819 10s. p.a., less £150 p.a. for board-residence. The post includes the care of general surgical and orthopædic cases and duties in the Casualty Department. Application is being made for this post to be recognised for the F.R.C.S.(Eng.) examination.

Applications, stating age, qualifications and experience, together with copies of 2 recent testimonials, should be sent immediately to Secretary, Forest Group Hospital Management Committee, Langthorne-road, E.11.

WANSTEAD HOSPITAL, Hermon Hill, London, E.11. (191 Beds.) HOUSE PHYSICIAN required. Post vacant 2nd June, 1957.

Applications, with full details and copies of 2 recent testimonials, should be sent immediately to Secretary, Forest Group Hospital Management Committee, Langthorne-road, E.11.

WHIPPS CROSS HOSPITAL, London, E.11. Applications are invited for the posts, which become vacant 1st July, 1957, of Pre-registration HOUSE SURGEON (2 posts), general surgery. Posts recognised for the F.R.C.S.

Application forms from the Hospital Secretary and returnable by 20th May, 1957.

WHIPPS CROSS HOSPITAL, London, E.11. Applications are invited for the post, which becomes vacant 1st July, 1957, of Pre-registration HOUSE SURGEON (Gynæcology and Urology Departments).

Application forms from the Hospital Secretary and returnable by 20th May, 1957.

WHIPPS CROSS HOSPITAL, London, E.11. Applications are invited for the posts, which become vacant 1st July, 1957, of Pre-registration HOUSE PHYSICIAN (2 posts), general medicine.

Application forms from the Hospital Secretary and returnable by 20th May, 1957.

WILLESDEN GENERAL HOSPITAL, Harlesden-road, N.W.10. NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. RESIDENT SURGICAL REGISTRAR required. Post recognised under Fellowship regulations. Also Locum RESIDENT SURGICAL REGISTRAR required from 20th May.

Application forms from, and returnable to, Group Secretary, Central Middlesex Group Hospital Management Committee, Park Royal, N.W.10, by 18th May.

WILLESDEN GENERAL HOSPITAL, Harlesden-road, N.W.10. RESIDENT HOUSE SURGEON required. 6 months from 14th June plus 14 days locum from 1st June. Pre-registration candidates eligible.

Applications to Hospital Secretary by 15th May.

WOOLWICH GROUP HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (anæsthetics). 2 appointments, vacant mid-June, 1 at Memorial Hospital, Woolwich, and 1 at St. Nicholas Hospital, Plumstead. Both recognised for F.F.A.R.C.S. and D.A. 6 months resident appointments and may be renewed.

Apply to Group Secretary, Memorial Hospital, Woolwich, S.E.18.

ABERDEEN GENERAL HOSPITALS BOARD OF MAN-AGEMENT. WOODEND GENERAL HOSPITAL. Applications are invited for the appointment of JUNIOR HOSPITAL MEDICAL OFFICER in the Thoracic Surgery Department of the above Hospital. The post which is non-resident, is now vacant. The appointment is subject to the conditions of service issued by the Department of Health for Scotland.

Applications, giving details of qualifications and experience, and the names of 2 referees, should be lodged with the Secretary, Aberdeen General Hospitals, P.O. Box 92, 62, Queen's-road, Aberdeen, within 14 days of the appearance of this advertisement.

AYLESBURY. ROYAL BUCKINGHAMSHIRE HOS-PITAL. Accident and Orthopædic and Children's General Surgery. HOUSE OFFICER or SENIOR HOUSE OFFICER. Grade according to experience. Pre-registration post but registered practitioners invited to apply. Recognised for F.R.C.S.

Apply, with copies of 2 testimonials, to Secretary-Superintendent.

AYLESBURY. ROYAL BUCKINGHAMSHIRE HOS-PITAL. OPHTHALMIC HOUSE OFFICER required, late June. Post recognised for D.O.

Apply, with copies of 2 testimonials, to Secretary-Superintendent.

BEDFORD GENERAL HOSPITAL. (436 Beds.) Ortho-PÆDIC HOUSE SURGEON required. Pre- or post-registration; recognised for F.R.C.S. Post offers wide experience in a busy Specialist Orthopædic and Traumatic Unit.

Inquiries and applications with copies of 2 recent testimonials, to Group Secretary, 3, Kimbolton-road, Bedford.

BEDFORD GENERAL HOSPITAL. (439 Beds.) House SURGEON required. Pre- or post-registration. Recognised for F.R.C.S. Post offers exceptional opportunities for general experience in busy acute Surgical Units.

Inquiries and applications, with copies of 2 recent testimonials, to Group Secretary, 3, Kimbolton-road, Bedford.

BEVERLEY, YORKSHIRE. WESTWOOD HOSPITAL. ASSISTANT PATHOLOGIST (Senior House Officer grade) required in Area Laboratory. Offers experience all branches of pathology.

Detailed applications to Group Secretary.

BATLEY. THE GENERAL HOSPITAL. Applications are invited for an immediate vacancy as SENIOR HOUSE OFFICER (resident) at this specialist hospital having 36 orthopædic, 26 E.N.T., 18 ophthalmic, 14 general surgical and 5 pay beds. If required, accommodation could be made available for a Doctor and wife, but no children.

Applications, with testimonials, to be forwarded to the Administrative Officer, The General Hospital, Carlinghow, Batley, as soon as possible.

BATLEY. THE GENERAL HOSPITAL, Carlinghow Hill, BATLEY. Applications are invited for the resident post of HOUSE OFFICER (ophthalmic and general surgery). The Hospital has 99 Beds which are allocated to the specialties of general surgery, E.N.T., orthopædic and ophthalmology.

Apply in writing to the Administrative Officer at the Hospital, enclosing copies of 2 testimonials.

BANGOR. ST. DAVID'S HOSPITAL. (136 Beds and Cots.) (Specialist Hospital for Obstetrics, Gynæcology and Pædiatrics.) Part I Midwifery Training School. Applications are invited for the post of RESIDENT SENIOR HOUSE OFFICER (obstetrics) in the Gynæcological and Obstetrical Department of the above Hospital. Previous obstetrical experience essential. The post is recognised by the Royal College of Obstetricians and Gynæcologists for the Membership examination. Salary according to scale.

Applications, stating age, qualifications and experience, together with copies of 3 recent testimonials, to be forwarded to the Group Secretary, Caernarvon and Anglesey Hospital Management Committee, Plas Gwyn, Ffriddoedd-road, within 10 days of the appearance of this advertisement.

BIRMINGHAM ACCIDENT HOSPITAL AND REHABI-LITATION CENTRE, Bath-row, BIRMINGHAM, 15. SENIOR HOUSE SURGEON. Applications are invited for post vacant June. Hospital is largest Traumatic Unit in the country and treated 53,000 new patients last year, including 2000 thermal injuries. Post offers ample opportunity for practical experience in management of all types of injury—orthopædic, thoracic, abdominal and neurosurgical cases. Hospital is recognised for casualty training by Royal College of Surgeons. Residential charge £150 p.a.

Applications, with details naming 2 referees, to Administrator.

BIRMINGHAM, 18. DUDLEY ROAD HOSPITAL. (780 Beds.) HOUSE PHYSICIAN (general medicine), recognised for pre-registration. Vacant 1st July, 1957. Responsible for approximately 80 male and female medical beds in unit under control of 2 Consultant Physicians.

Applications, enclosing 2 testimonials, to the Group Secretary by 25th May, 1957.

BIRMINGHAM GROUP 9 HOSPITAL MANAGEMENT COMMITTEE. Whole-time JUNIOR HOSPITAL MEDICAL OFFICER for mental deficiency group of 1400 Beds. Scope for training in modern treatment methods. Recognised for D.P.M. Resident (single accommodation only) or non-resident.

Application forms may be obtained from the Secretary, Coleshill Hall Hospital, Coleshill, Birmingham.

BIRMINGHAM REGIONAL HOSPITAL BOARD.

(1) **Coventry Group No. 20, Stoney Stanton-road, Coventry**

REGISTRAR (gynæcology and obstetrics) for George Eliot Hospital, Nuneaton. Recognised M.R.C.O.G. Resident. Experience specialty essential. Higher qualification desirable.

(2) **Wolverhampton Group, Royal Hospital, Wolverhampton**

REGISTRAR (pathology), resident or partly resident. Experience specialty an advantage. Duties in all branches of clinical pathology centred on the Royal Hospital.

(3) **Stafford Group, 13, Foregate-street, Stafford**

REGISTRAR (surgery), resident. Duties mainly at Staffordshire General Infirmary (175 Beds) and Yarnfield Recovery Unit (32 Beds). Recognised for F.R.C.S. Experience surgery essential, higher qualification desirable. House available if required for family.

(4) **Birmingham (Selly Oak) Group, Oak Tree-lane, Birmingham, 29**

(*a*) REGISTRAR (pathology) for Birmingham Accident Hospital. Vacant now. Previous experience essential. Recognised (12 months) for Diploma in Pathology. Further details from Consultant Pathologist.

(*b*) REGISTRAR (surgical) for Birmingham Accident Hospital and Rehabilitation Centre, Bath-row, Birmingham, 15 (215 Beds). Special experience available in treatment of shock, infection and principles of plastic surgery in connection with M.R.C. Burns Unit. Previous experience not essential. F.R.C.S. advantageous.

Application forms from Group Secretaries to be returned by 20th May, 1957.

BIRMINGHAM. UNITED BIRMINGHAM HOSPITALS. Applications are invited from registered medical practitioners for the following appointments vacant on 7th July, 1957.

(*a*) 2 RESIDENT GYNÆCOLOGICAL HOUSE SURGEONS for duty at the Women's Hospital, Sparkhill.

(*b*) 1 RESIDENT OBSTETRICAL HOUSE SURGEON for duty at the Maternity Hospital, Loveday-street.

The posts are recognised for the D.Obst.R.C.O.G. and M.R.C.O.G.

Application forms obtainable from the House Governor, Birmingham and Midland Hospitals for Women, Showell Green-lane, Birmingham, 11, to be returned not later than 29th May, 1957.

BIRMINGHAM. THE UNITED BIRMINGHAM HOS-PITALS. Applications are invited for the appointment of a MEDICAL RESEARCH ASSISTANT (Registrar or Senior Registrar grade) to work at the Queen Elizabeth and Children's Hospitals in cardiovascular research. Candidates must possess the M.R.C.P., but previous research experience is not essential. The successful candidate will be expected to work under the direction of Mr. A. L. d'Abreu in the Professorial Departments of Medicine, Surgery and Pædiatrics. He will have clinical responsibilities but will be expected to devote a substantial portion of his time to research for which full laboratory accommodation and facilities are available. The appointment will be for 1 year in the first instance, and salary will be in accordance with the appropriate National Health Service grades.

Application forms to be obtained from the Secretary, United Birmingham Hospitals, Queen Elizabeth Hospital, Birmingham, 15, and should be returned by 18th May, 1957.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. Applications are invited for the appointment of a SURGICAL RESEARCH ASSISTANT (Registrar or Senior Registrar grade) to work at the Queen Elizabeth and Children's Hospitals in cardiovascular research. Candidates must possess the F.R.C.S., but previous research experience is not essential. The successful candidate will be expected to work under the direction of Mr. A. L. d'Abreu in the Professorial Departments of Medicine, Surgery and Pædiatrics. He will have clinical responsibilities but will be expected to devote a substantial portion of his time to research for which full laboratory accommodation and facilities are available. The appointment will be for 1 year in the first instance, and salary will be in accordance with the appropriate National Health Service grades.

Application forms to be obtained from the Secretary, United Birmingham Hospitals, Queen Elizabeth Hospital, Birmingham, 15, and should be returned by 18th May, 1957.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. THE BIRMINGHAM AND MIDLAND HOSPITALS FOR WOMEN (incorporating the Hospital for Women and the Birmingham Maternity Hospital), Showell Green-lane, SPARKHILL, BIRMINGHAM, 11. Applications are invited for the appointment of OBSTETRICAL AND GYNÆCOLOGICAL REGISTRAR (Senior Registrar grade). The appointment will be for 1 year in the first instance and subject to annual review. The successful candidate may subsequently be required to spend not more than 2 years in a selected Hospital of the Birmingham Regional Hospital Board in accordance with an arrangement for interchange of Registrars agreed between the 2 Boards. Candidates must be registered medical practitioners, and should hold the M.R.C.O.G. qualification.

Forms of application may be obtained from, and should be returned immediately to, the House Governor at the above address. G. A. PHALP, Secretary.

BIRMINGHAM. THE UNITED BIRMINGHAM HOSPITALS. THE CHILDREN'S HOSPITAL, Ladywood-road, BIRMINGHAM, 16. Applications are invited for the post of RESIDENT SURGICAL OFFICER (Registrar), vacant 1st August, 1957, for 1 year. Preference will be given to applicants with a knowledge of pædiatric surgery and who hold a higher qualification.

Forms of application may be obtained from the House Governor and should be returned by 24th May, 1957.

G. A. PHALP, Secretary to the Board of Governors.

BISHOP AUCKLAND. THE GENERAL HOSPITAL. SOUTH WEST DURHAM HOSPITAL MANAGEMENT COMMITTEE. HOUSE OFFICER (obstetrics and gynæcology). Applications invited from registered or pre-registration practitioners. Vacant 1st July, 1957. Recognised for D.Obst.R.C.O.G. Departmental beds 69.

Apply, naming 2 referees, to Group Secretary at above address.

BLACKBURN (near). CALDERSTONES HOSPITAL, WHALLEY, near BLACKBURN, LANCASHIRE. (For Mental Defectives—2378 Beds.) CALDERSTONES HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of Locum Tenens JUNIOR HOSPITAL MEDICAL OFFICER for holiday relief over approximately 6 months. Salary £19 5s. per week. Residential quarters available. No previous experience of mental diseases or mental deficiency necessary. This post would give valuable experience to practitioners who have the necessary 1 years experience after full registration and who are proposing to take up public health appointments and to study for the D.P.H. or D.P.M.

Applications, stating age, qualifications and experience, together with the names and addresses of 3 referees, to be submitted to the Medical Superintendent, Calderstones Hospital, Whalley, near Blackburn, as soon as possible.

BLACKBURN AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (anæsthetics) required middle of June, 1957, for duties throughout the Group, mainly at Royal Infirmary, Blackburn. Residence at Royal Infirmary, Blackburn. Post recognised for D.A. and F.F.A.R.C.S.

Apply to Group Secretary, Hospital Management Committee Office, Royal Infirmary, Blackburn, giving names of 2 referees.

BLACKPOOL VICTORIA HOSPITAL. (353 Beds.) HOUSE OFFICER (orthopædic surgery). Resident pre-registration post recognised for F.R.C.S. available from 25th May, 1957, in the main acute general hospital serving the Blackpool and Fylde area.

Applications, stating age, experience (if any) and giving the names and addresses of 2 referees, should be sent to the Hospital Secretary.

BLACKPOOL VICTORIA HOSPITAL. (Acute General Hospital—353 Beds.) CASUALTY OFFICER (Junior Hospital Medical Officer status). Post vacant at end of June. Salary £852 10s.–£55–£1182 10s. p.a. Residence optional. Tenure of post 4 years. Recognised for F.R.C.S.

Applications, stating age, qualifications, experience and giving the names and addresses of 2 referees, should be sent to the Hospital Secretary.

BOURNEMOUTH. ROYAL VICTORIA HOSPITAL, Shelley-road. BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of RESIDENT SENIOR HOUSE OFFICER (anæsthetics). The post, which becomes vacant on 25th May, 1957, is recognised for the D.A. and F.F.A.R.C.S., and is normally tenable for 12 months. Experience with Thoracic Unit available.

Applications to the Hospital Secretary.

BOURNEMOUTH. ROYAL VICTORIA HOSPITAL, Shelley-road. BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of GENERAL HOUSE SURGEON to the Senior Consultant Surgeon. The post which is now vacant is recognised for the F.R.C.S. examination and for pre-registration purposes.

Applications to the Hospital Secretary.

BOURNEMOUTH. ROYAL VICTORIA HOSPITAL, Shelley-road. BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of a SENIOR HOUSE OFFICER (resident) (orthopædics and casualty combined). The post, which became vacant on 6th May, is recognised for the F.R.C.S. examination.

Applications to the Hospital Secretary.

BRADFORD, YORKSHIRE. ST. LUKE'S HOSPITAL. HOUSE SURGEON (general surgery/plastic) required. Recognised for F.R.C.S. and pre-registration purposes.

Applications, stating age, nationality, qualifications, and experience, to the Secretary, Bradford A Group Hospital Management Committee, Bradford Royal Infirmary.

BRADFORD, YORKSHIRE. THE ROYAL EYE AND EAR HOSPITAL. (105 Beds. SENIOR HOUSE OFFICER required for E.N.T. Department of 56 Beds. Recognised for D.L.O. and F.R.C.S. Post vacant now. Salary £819 10s. p.a., less £150 p.a. residential emoluments.

Applications, stating age, nationality, qualifications and experience with copy testimonials, to the Secretary, Royal Infirmary, Bradford.

BRIGHTON. ROYAL SUSSEX COUNTY HOSPITAL. (312 Beds.) 1 HOUSE SURGEON required mid-May. Recognised for pre-registration and F.R.C.S.

Applications, stating usual particulars, and naming 2 referees, to the Administrative Officer.

BRIGHTON GENERAL HOSPITAL. Applications are invited for the appointment of HOUSE SURGEON to the Orthopædic Unit. Salary in accordance with national scale. Vacant 24th June, 1957. This post is recognised as a pre-registration appointment.

Applications, stating age, qualifications, and experience, together with copies of recent testimonials, should be sent to the Physician-Superintendent, Brighton General Hospital, Elm-grove, Brighton.

BRIGHTON GENERAL HOSPITAL. Applications are invited for the appointment of HOUSE SURGEON (recognised for F.R.C.S.) to the General Surgical Unit (60 Beds). The post will be vacant on 17th June, 1957. Salary in accordance with national scale. The post is recognised as a pre-registration appointment.

Applications, stating age, qualifications, experience, and giving the names of 2 referees, should be sent to the Physician-Superintendent, Brighton General Hospital, Elm-grove, Brighton, 7.

BRIGHTON. NEW SUSSEX HOSPITAL, Windlesham-road. BRIGHTON AND LEWES HOSPITAL MANAGEMENT COMMITTEE. Vacancy for HOUSE PHYSICIAN (Female) for 6 months commencing 17th June, 1957. Includes duties in Gynæcology Department. Open to pre-registration candidates.

Applications, stating age, nationality, qualifications, and experience, with copies of 3 testimonials and/or names of referees, to be sent to the Administrative Officer as soon as possible.

BRISTOL. COSSHAM/FRENCHAY HOSPITAL MANAGEMENT COMMITTEE. FRENCHAY HOSPITAL. (542 staffed beds—expanding.) SENIOR HOUSE OFFICER (Regional Department of Neurosurgery). Vacancy occurs about mid-June for the above post, tenable for 6–12 months. The post offers useful surgical experience and the opportunity of gaining a working knowledge of neurological diagnosis. Recognised for F.R.C.S.

Applications to the Secretary, Frenchay Hospital, quoting "N.S.F." 2 referees required.

BURTON GENERAL HOSPITAL AND ANDRESSEY HOSPITAL, BURTON UPON TRENT. HOUSE SURGEON (gynæcological and obstetrics) required at above Hospital as from 1st July, 1957. Post recognised for pre-registration purposes.

Apply Group Secretary.

BURTON-ON-TRENT GENERAL HOSPITAL. Locum REGISTRAR (surgical) required at the above Hospital (approved for F.R.C.S.) on a week to week basis.

Applications, with full details, to Group Secretary, General Hospital, Burton upon Trent.

BURTON-ON-TRENT (near). BRETBY HALL ORTHOPÆDIC HOSPITAL. (78 available orthopædic beds.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT REGISTRAR (orthopædics) required for inpatient and operative work with children and adults. Hospital quarters available. Duties include certain outpatient responsibilities at Derbyshire Royal Infirmary. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 20th May, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

BURY ST. EDMUNDS. WEST SUFFOLK GENERAL HOSPITAL. (262 Beds.) Applications invited, with 3 references, to Hospital Secretary.

(*a*) HOUSE OFFICER or SENIOR HOUSE OFFICER for orthopædic and casualty duties. Recognised for F.R.C.S. (surgical). Vacant late June. A Junior Hospital Medical Officer Casualty Officer is also employed.

(*b*) HOUSE PHYSICIANS for (i) general medical duties, and (ii) pædiatric and general medical duties; vacant late May and mid-June respectively.

(*c*) HOUSE SURGEONS for (i) general surgical and other duties, for (ii) general surgical (latter recognised for F.R.C.S.); vacant late May and mid-July respectively.

(*d*) HOUSE SURGEON—gynæcological and obstetric duties. Recognised for D. Obst. R.C.O.G. Vacant late July.

All posts except (*a*) as shown are recognised for pre-registration but for post (*d*) considered advisable to have held a previous post.

BURY AND ROSSENDALE HOSPITAL MANAGEMENT COMMITTEE. ROSSENDALE GENERAL HOSPITAL, RAWTENSTALL, LANCS. Applications are invited for the post of SENIOR HOUSE OFFICER in General Medicine.

Apply, stating full details and names of 2 referees, to—

H. WILKINSON, Group Secretary.

BURY AND ROSSENDALE HOSPITAL MANAGEMENT COMMITTEE. FAIRFIELD GENERAL HOSPITAL. Applications are invited for the post of JUNIOR HOSPITAL MEDICAL OFFICER (psychiatry). The appointment is for 1 year in the first instance, subject to renewal annually. This post is recognised for the D.P.M. for 12 months.

Applications, with full details of age, qualifications, and experience, together with names of 2 referees, should be submitted to H. WILKINSON, Group Secretary.

Bury General Hospital, Bury, Lancs.

CAMBRIDGE. MATERNITY HOSPITAL. Resident OBSTETRICAL OFFICER (second or subsequent post) for 6 months from 1st July. Recognised Pre-registration Service. Recognised for M.R.C.O.G. and D.Obst.R.C.O.G. examinations.

Apply, stating age, nationality, qualifications and experience with dates, and copies of 3 testimonials, to Secretary, United Cambridge Hospitals, Addenbrooke's Hospital, by 25th May. Interviews early June.

CARDIFF. ST. DAVID'S HOSPITAL. Senior House OFFICER (resident) required for acute medical wards of above Hospital from 24th June, 1957, to work under direction of Consultants.

Form of application from Group Secretary, Cardiff Hospital Management Committee, 44, Cathedral-road, Cardiff.

CARDIFF. THE UNITED CARDIFF HOSPITALS. Applications are invited for the appointment of SENIOR HOUSE OFFICER in Anæsthetics. Non-resident post, to commence 1st August. Appointment based at the Cardiff Royal Infirmary, but will include duties at other hospitals in the area.

Application forms are available from the Secretary to the Board at the Cardiff Royal Infirmary, Newport-road, Cardiff, and should be returned within 14 days of the appearance of this advertisement.

CARDIFF. THE UNITED CARDIFF HOSPITALS. Applications are invited for the appointment of SENIOR REGISTRAR in the Department of Diagnostic Radiology at the Cardiff Royal Infirmary. Candidates must hold a Diploma in Medical Radiology.

Application forms may be obtained from the Secretary to the Board, at the Cardiff Royal Infirmary, Newport-road, Cardiff, and should be returned within 14 days of the appearance of this advertisement.

CARDIFF. UNITED CARDIFF HOSPITALS. Applications are invited for the appointment of SENIOR HOUSE OFFICER in Ophthalmology at the Cardiff Royal Infirmary. Non-resident post, commencing 1st August, 1957.

Application forms are available from the Secretary to the Board at the Cardiff Royal Infirmary, Newport-road, Cardiff, and should be returned within 14 days of the appearance of this advertisement.

CARDIFF. UNITED CARDIFF HOSPITALS. Applications are invited for the appointment of SENIOR HOUSE OFFICER in Pathology at Llandough Hospital, Penarth, Glam, vacant 1st August. Resident post.

Application forms are available from the Secretary to the Board at the Cardiff Royal Infirmary, Newport-road, Cardiff, and should be returned within 14 days of the appearance of this advertisement.

CARDIFF. WHITCHURCH HOSPITAL. (800 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER in Psychiatry (Male or Female) from practitioners who have held general house appointments. Opportunities exist for gaining experience in all branches of psychiatry. Salary according to Whitley scale, less £150 p.a. if resident.

Forms of application to be obtained from the Physician-Superintendent, to whom they should be returned, together with the names of 2 referees.

CARSHALTON, SURREY. QUEEN MARY'S HOSPITAL FOR CHILDREN. Locum ANÆSTHETIC REGISTRAR required from 26th May to 8th June, 1957, inclusive.

Apply to the Group Secretary.

CARSHALTON. QUEEN MARY'S HOSPITAL FOR CHILDREN. (700 Beds.) SURGICAL AND ORTHOPÆDIC REGISTRAR required for duties which include shared Registrar responsibility for 120 orthopædic beds and 60 acute and general beds. Applicants are invited to visit the Hospital by appointment with the Physician-Superintendent.

Applications, which should be made on forms obtainable from the Group Secretary, should be returned by 31st May, 1957.

CHELMSFORD. ST. JOHN'S HOSPITAL. House SURGEON (pre-registration, first or second post). Duties commence 31st May, 1957. The Hospital deals with a large number of routine and emergency cases.

Applications, stating age, nationality, qualifications and experience, together with copies of recent testimonials, should be received not later than 14th May, 1957, by the Secretary, Chelmsford Group Hospital Management Committee, Chelmsford and Essex Hospital, London-road, Chelmsford.

CHEPSTOW, MONMOUTHSHIRE. ST. LAWRENCE HOSPITAL. (127 plastic surgery, 50 orthopædic beds.) PLASTIC SURGERY, JAW INJURIES AND BURNS CENTRE. SENIOR HOUSE OFFICER in Plastic Surgery required about 1st June. There are 2 residents in plastic surgery and 1 in orthopædics. Post tenable 6 or 12 months as desired, and candidates experienced in another specialty wishing to gain plastic surgery experience will be considered. Salary £819 10s. less £150 board-residence.

Write, quoting 2 referees, to T. A. JONES, Group Secretary, 64, Cardiff-road, Newport, Mon.

CHERTSEY, SURREY. ST. PETER'S HOSPITAL (late Botley's Park War Hospital). (430 Beds.) RESIDENT HOUSE SURGEON (Intern) required from 16th May, 1957. Salary in accordance with terms and conditions of National Health Service.

Applications, together with names and addresses of referees, to be sent to the Physician-Superintendent, St. Peter's Hospital, as soon as possible.

CHICHESTER. ROYAL WEST SUSSEX HOSPITAL. (202 acute beds.) 2 RESIDENT HOUSE SURGEONS required for 6 months appointment. National salary scale for either provisionally or fully registered practitioners. Posts approved for pre-registration practitioners, and F.R.C.S. 7 residents including Resident Surgical Officer and 3 House Surgeons. 1 vacant immediately. 1 vacant 31st May.

Applications, stating age, experience, qualifications, with references or names of referees, to Senior Administrative Officer.

COLCHESTER GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for :—

Essex County Hospital, Colchester, Essex (185 Beds)

Post of SENIOR HOUSE OFFICER (anæsthetics). Post tenable for 1 year. Recognised for F.F.A.R.C.S. and D.A. The successful candidate will be called upon to give anæsthetics in other hospitals in the Group.

Post of SENIOR HOUSE OFFICER (casualty and radiotherapy). Post tenable for 6 months or 1 year. Recognised for F.R.C.S.

Clacton and District Hospital, Clacton-on-Sea, Essex (58 Beds)

Post of REGISTRAR (temporary). Required as Resident Casualty Officer during summer for period not exceeding 6 months.

Harwich and District Hospital, Dovercourt, Essex (30 Beds)

Post of SENIOR HOUSE OFFICER (temporary), required during summer months from June to September. Duties include medical, surgical and casualty work.

Applications, with copies of 3 testimonials, to Group Secretary, Colchester Hospital Management Committee, 14, Pope's-lane, Colchester, Essex.

CROYDON. MAYDAY HOSPITAL. (611 Beds.) Croydon GROUP HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON (pre-registration) required as from 2nd June, 1957. Post recognised for F.R.C.S.

Application forms obtainable from GEORGE A. PAINES, Group Secretary, Hospital Management Committee, General Hospital, London-road, Croydon, Surrey.

CROYDON. MAYDAY HOSPITAL. (611 Beds.) Croydon GROUP HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON (pre-registration) required as from 15th June, 1957.

Application forms obtainable from GEORGE A. PAINES, Group Secretary, Hospital Management Committee, General Hospital, London-road, Croydon, Surrey.

CROYDON. MAYDAY HOSPITAL. (611 Beds.) Croydon GROUP HOSPITAL MANAGEMENT COMMITTEE. HOUSE PHYSICIAN (pre-registration) required as from 1st June, 1957.

Application forms obtainable from GEORGE A. PAINES, Group Secretary, Hospital Management Committee, General Hospital, London-road, Croydon, Surrey.

CROYDON. QUEEN'S HOSPITAL. (450 Beds.) Geriatric UNIT. CROYDON GROUP HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (resident). Post vacant as from 17th May.

Application forms obtainable from GEORGE A. PAINES, Group Secretary, Hospital Management Committee, General Hospital, London-road, Croydon, to be returned within 14 days.

DONCASTER ROYAL INFIRMARY. (Recognised under the regulations for the Fellowship and D.L.O.) Applications are invited for the post of SENIOR HOUSE OFFICER in the E.N.T. Department. Post vacant beginning June.

Applications to the Group Secretary, Doncaster Hospital Management Committee, at Doncaster Royal Infirmary.

DONCASTER ROYAL INFIRMARY. (330 Beds. Recognised for training for F.R.C.S. examination.) SHEFFIELD REGIONAL HOSPITAL BOARD. Whole-time RESIDENT REGISTRAR (orthopædics) required. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 20th May, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

DORCHESTER, DORSET. HERRISON MENTAL HOS-PITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners for the resident post of JUNIOR HOSPITAL MEDICAL OFFICER at the above Hospital. Salary and conditions of service in accordance with national scale. The Hospital carries out all forms of modern treatment, and active research is carried out. The post offers good facilities for training in the specialty of psychiatry.

Applications, with names of 3 referees, should be sent at once to the Medical Superintendent, Herrison Hospital, Dorchester, Dorset.

DRIFFIELD, YORKSHIRE. EAST RIDING GENERAL HOSPITAL. (247 Beds.) SENIOR HOUSE PHYSICIAN, vacant mid-May. Duties to include acute and chronic medicine.

Detailed applications, with references, to the Group Secretary, Westwood Hospital, Beverley, Yorkshire.

DURHAM COUNTY HOSPITAL. (116 Beds.) Senior HOUSE OFFICER in Orthopædics required immediately. Resident. The County Hospital is the main Orthopædic and Accident Hospital in a busy mining and industrial area. Experience can be obtained in all branches of orthopædics.

Applications, with particulars of previous experience and names of 2 referees, to Group Secretary, Dryburn Hospital, Durham.

DURHAM. COUNTY HOSPITAL. (116 Beds.) Resident HOUSE SURGEON required in Orthopædics and Casualty. Post recognised for pre-registration purposes. This post offers facilities for good and varied experience in a busy orthopædic and accident hospital which serves a wide mining and industrial area.

Apply, giving age, experience, and names of 2 referees, to the Group Secretary, Dryburn Hospital, Durham.

DAGENHAM HOSPITAL, Rainham-road South, Dagenham (near Dagenham East Underground Station). Applications are invited for the position of JUNIOR HOSPITAL MEDICAL OFFICER (resident) at the above Hospital (150 Beds) for pulmonary tuberculosis—all stages. Salary in accordance with the national scale (£852 10s.–£55–£1182 10s. p.a.), less residential charges. Suitable for candidate studying for higher degree. Further particulars available from the Physician-Superintendent.

Applications, stating age, qualifications and previous experience, together with recent testimonials, should be sent to the undersigned within 7 days of the appearance of this advertisement. H. F. HARRIS, Group Secretary,

Ilford and Barking Group Hospital Management Committee.
King George Hospital, Ilford, Essex.

EDGWARE GENERAL HOSPITAL, Edgware, Middlesex. RESIDENT HOUSE PHYSICIAN for above Hospital. Post vacant 30th May, 1957. 6 months appointment. Post recognised for pre-registration purposes.

Applications, stating name, age, address, and enclosing copies of up to 3 recent testimonials, to Medical Director of Hospital by 18th May, 1957.

ENFIELD, MIDDLESEX. CHASE FARM HOSPITAL. 2 RESIDENT HOUSE PHYSICIANS. Approved pre-registration appointments. Vacant early July, 1957. General medical duties. 6 months appointment.

Applications, with the names and addresses of 2 referees, to Group Secretary, Enfield Group Hospital Management Committee, Chase Farm Hospital, quoting reference "B" or "S."

EPPING. ST. MARGARET'S HOSPITAL. House SURGEON (pre- or post-registration) to very busy General Surgical Unit. Hospital within easy reach of Central London. Post vacant 1st July, 1957.

Applications, with copies of testimonials, including 1 from medical school, to reach the Group Secretary, Epping Group Hospital Management Committee, "Oak Cottage," The Plain, Epping, Essex, by 24th May, 1957.

EPPING. ST. MARGARET'S HOSPITAL. House PHYSICIAN (pre-registration post) to Consultant in General Medicine. Post vacant 1st July, 1957.

Applications, with copies of testimonials, including 1 from medical school, to reach the Group Secretary, Epping Group Hospital Management Committee, "Oak Cottage," The Plain, Epping, Essex, by 24th May, 1957.

EXETER. ROYAL DEVON AND EXETER HOSPITAL. Applications are invited from pre-registration and registered medical practitioners for the appointment of HOUSE SURGEON (general surgery), vacant 23rd May, 1957.

Applications, with copies of 2 recent testimonials, to the Hospital Secretary by 17th May, 1957.

GRAVESEND AND NORTH KENT HOSPITAL, Gravesend, Kent. MEDWAY AND GRAVESEND HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the resident post of HOUSE SURGEON, vacant now. The successful applicant will be attached to 2 Consultant Surgeons with opportunities for extensive surgery and special experience in vascular work. Recognised for F.R.C.S. and as a pre-registration post. Salary £425–£525 p.a., according to experience, less £125 for residential emoluments.

Applications, stating age, nationality, qualifications and experience, to Hospital Secretary.

GUILDFORD. ROYAL SURREY COUNTY HOSPITAL. RESIDENT HOUSE SURGEON for Orthopædic and Traumatic Unit. The post, which is now vacant, is tenable for 6 months. It is recognised for the F.R.C.S. examination and open to pre-registration candidates. The unit deals with many traumatic cases.

Applications, with copies of 3 testimonials, should be sent to the Hospital Secretary.

GUILDFORD. ROYAL SURREY COUNTY HOSPITAL. RESIDENT HOUSE SURGEON required for general surgery. Post is vacant on 17th May and tenable for 6 months. It is approved for pre-registration candidates and recognised for the F.R.C.S. examination.

Applications, with copies of 3 testimonials, should be sent to the Hospital Secretary as soon as possible.

GUILDFORD. ST. LUKE'S HOSPITAL. Guildford GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the post of REGISTRAR (obstetrics and gynæcology), 1 of 2. Post offers extensive experience in obstetrics and gynæcology. Possession of higher qualification an advantage. Unit is recognised for M.R.C.O.G. Hospital may be visited by arrangement direct (Tel. : Guildford 62851, ext. 37).

Application forms from Secretary, Guildford Group Hospital Management Committee, St. Luke's Hospital, Guildford, to whom they should be returned by 25th May, 1957.

HALIFAX AREA HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON and SENIOR HOUSE OFFICER in General Surgery required at hospitals within this Group. Posts vacant now.

Apply Group Secretary, Royal Halifax Infirmary, Halifax.

HEMEL HEMPSTEAD, HERTFORDSHIRE. WEST HERTS HOSPITAL. HOUSE SURGEON (pre-registration) required.

Applications, giving full details and copies of recent testimonials, should be sent to the Hospital Secretary at once.

HEREFORD. GENERAL HOSPITAL. (154 Beds.) HOUSE OFFICER (general surgery) required, pre-registration post. Hospital recognised by R.C.S. Duties include care of general surgical beds and in addition for 3 months of orthopædic beds and for 3 months of E.N.T. beds.

Applications, with copies of 2 testimonials, to be sent to the Group Secretary, Victoria House, Eign-street, Hereford.

HARTLEPOOLS HOSPITALS MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (anæsthetics), recognised for F.F.A.R.C.S. and D.A., for this Group of Hospitals (new post). Departmental staff : 3 Consultants, 1 Resident Registrar, 1 Senior House Officer.

Applications, stating age, nationality and qualifications and accompanied by copies of 2 testimonials, should reach the Group Secretary at the General Hospital, West Hartlepool, as soon as possible.

HASTINGS. ROYAL EAST SUSSEX HOSPITAL. (150 Beds.) Applications are invited for the pre-registration post of HOUSE SURGEON for general surgery and orthopædics in this busy well-equipped hospital which is the principal surgical hospital in the Hastings Group. Recognised by Royal College of Surgeons. House Officer staff of 4.

Applications, stating age, nationality, qualifications and experience, with copies of 2 recent testimonials, to the Administrator of the Hospital.

HERTFORD COUNTY HOSPITAL. (171 Beds. Hospital situated 21 miles from London.) Applications are invited for the undermentioned appointments :—

HOUSE SURGEON (general) first or second post. To commence 13th June, 1957.

HOUSE SURGEON (general, gynæcology and obstetrics) first or second post. To commence 13th June, 1957.

Pre-registration posts ; recognised under F.R.C.S. regulations.

Applications to Group Secretary, Hertford Hospital Management Committee, County Hospital, Hertford, Herts.

HERTFORD COUNTY HOSPITAL. (171 Beds. Hospital situated 21 miles from London.) Applications are invited for appointment of RESIDENT HOUSE PHYSICIAN (Male or Female), second post held. Recognised pre-registration post. 6 months appointment. Preference given to applicants who have held resident surgical or medical posts in general hospital. Duties to commence 1st June, 1957.

Applications to Group Secretary, Hertford Hospital Management Committee, County Hospital, Hertford, Herts.

HILLINGDON HOSPITAL, Uxbridge, Middlesex. (621 Beds.) 3 HOUSE SURGEONS required in General Surgery (general and traumatic, general and gastro-enterology, general and genito-urinary). All posts recognised for F.R.C.S. and for Pre-registration Service. Posts vacant mid-May and early June.

Apply, together with copies of 3 recent testimonials, to Medical Director by 20th May.

HITCHIN. NORTH HERTS HOSPITAL. House Surgeon required. Post vacant end of May. Recognised as pre-registration post.

Applications, stating age, nationality, qualifications and experience, together with copies of 3 recent testimonials, to the Medical Administrator, Lister Hospital Hitchin, as soon as possible.

HOUNSLOW HOSPITAL, Staines-road, Hounslow, MIDDLESEX. (General Acute—81 Beds.) Applications are invited for the appointment of RESIDENT HOUSE SURGEON. Recognised pre-registration appointment for 6 months. Vacant 5th June, 1957.

Applications, stating qualifications and age, together with copies of up to 3 recent testimonials, or names for reference, to the Hospital Secretary.

HUDDERSFIELD ROYAL INFIRMARY. (285 Beds.) HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from provisionally registered medical practitioners for the post of HOUSE SURGEON to the Princess Royal Maternity Home (57 Beds), to commence duty on 23rd May, 1957. The holder of the post, which is recognised for the D.Obst.R.C.O.G., will have access to the abnormal maternity and gynæcological beds at The Royal Infirmary. The Department is under the control of 2 Consultant Obstetricians and Gynæcologists. Salary in accordance with national scale.

Applications to be addressed to—

H. J. JOHNSON, Secretary to the Management Committee.
The Royal Infirmary, Huddersfield.

HUDDERSFIELD ROYAL INFIRMARY. (285 Beds.) HUDDERSFIELD HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON required, to commence duty on 20th May, 1957. The post is recognised as a pre-registration appointment and for the F.R.C.S. Salary in accordance with national scale.

Applications, together with copies of 3 recent testimonials, to be addressed to the undersigned as soon as possible.

H. J. JOHNSON, Secretary to the Management Committee.
The Royal Infirmary, Huddersfield.

HULL. KINGSTON GENERAL HOSPITAL. (419 Beds.) HULL A GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of RESIDENT JUNIOR HOUSE SURGEON (pre- or post-registration). Recognised for the F.R.C.S. examinations. Busy acute General Surgical Unit.

Applications, with 2 recent testimonials, to the Hospital Secretary.

HULL. KINGSTON GENERAL HOSPITAL. (419 Beds.) HULL A GROUP HOSPITAL MANAGEMENT COMMITTEE. HOUSE SURGEON (pre-registration post), resident, and tenable for 6 months. This post includes gynæcology, E.N.T., and general surgery.

Applications, with 2 recent testimonials, to the Hospital Secretary.

ILFORD. KING GEORGE HOSPITAL, Eastern-avenue, ILFORD. There will be a vacancy for a HOUSE SURGEON at above Hospital on 17th June, 1957. First or second post pre-registration. The post will be tenable for 6 months.

Applications, giving full particulars and accompanied by testimonials, should be sent to the undersigned within 7 days of the appearance of this advertisement.

H. F. HARRIS, Group Secretary,
Ilford and Barking Group Hospital Management Committee.

ILFORD. KING GEORGE HOSPITAL, Eastern-avenue, ILFORD. There will be a vacancy for a HOUSE PHYSICIAN at above Hospital on 17th June, 1957. First or second post pre-registration. The post will be tenable for 6 months.

Applications, giving full particulars and accompanied by testimonials, should be sent to the undersigned within 7 days of the appearance of this advertisement.

H. F. HARRIS, Group Secretary,
Ilford and Barking Group Hospital Management Committee.

ILFORD. KING GEORGE HOSPITAL, Eastern-avenue, ILFORD. There will be a vacancy for a HOUSE SURGEON at above Hospital on 8th June, 1957. First or second post pre-registration. This post will be tenable for 6 months.

Applications, giving full particulars and accompanied by testimonials, should be sent to the undersigned within 7 days of the appearance of this advertisement.

H. F. HARRIS, Group Secretary,
Ilford and Barking Group Hospital Management Committee.
King George Hospital.

ILFORD. KING GEORGE HOSPITAL. There will be a vacancy for a CASUALTY OFFICER at the above Hospital on 8th June, 1957, at a salary of £819 10s. p.a. Resident or non-resident. Senior House Officer grade. This post is recognised for the F.R.C.S.

Applications, giving full particulars and accompanied by testimonials, should be sent to the undersigned within 7 days of the appearance of this advertisement.

H. F. HARRIS, Group Secretary,
Ilford and Barking Group Hospital Management Committee.
King George Hospital, Ilford.

IPSWICH AND EAST SUFFOLK HOSPITAL. Anglesea ROAD WING. Applications are invited for the post of SENIOR HOUSE OFFICER in General Medicine, which is now vacant. The post offers excellent experience and opportunity for working for higher qualifications (M.R.C.P.). There are approximately 50 acute medical beds.

Applications, stating age, nationality, together with copies of recent testimonials, to Hospital Secretary as soon as possible.

IPSWICH AND EAST SUFFOLK HOSPITAL. Anglesea ROAD WING. (356 Beds.) Applications are invited for the post of HOUSE SURGEON to the Fracture and Orthopædic Department, vacant on 23rd June, 1957. Approved pre-registration post.

Applications, with copies of recent testimonials, to the Hospital Secretary.

IPSWICH AND EAST SUFFOLK HOSPITAL. Anglesea ROAD WING. (356 Beds.) Applications are invited for the post of HOUSE SURGEON to the E.N.T. and Ophthalmic Departments, vacant on 1st June, 1957. The post is recognised for pre-registration and for the D.L.O. examination.

Applications, giving full particulars and copies of recent testimonials, to Hospital Secretary.

IPSWICH AND EAST SUFFOLK HOSPITAL. Anglesea ROAD WING. (356 Beds.) Applications are invited for the post of HOUSE SURGEON to the Senior Consultant General Surgeon. The post is recognised for pre-registration and for the F.R.C.S. examinations.

Applications, with copies of recent testimonials, to Hospital Secretary.

IPSWICH AND EAST SUFFOLK HOSPITAL. Anglesea ROAD WING. (356 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER (Resident Anæsthetist). The post, which becomes vacant on 1st July, 1957, and is normally of 1 years duration, is recognised for the D.A. and the F.F.A.R.C.S. examinations.

Applications, stating age and nationality, together with recent testimonials, to Hospital Secretary.

IPSWICH AND EAST SUFFOLK HOSPITAL. Heath ROAD WING, IPSWICH. (280 Beds.) Applications invited for HOUSE SURGEON (pre-registration) to 2 General Surgeons. Recognised for the R.C.S. examinations.

Applications, with full particulars and copies of 3 recent testimonials, to the Hospital Secretary.

ISLEWORTH. WEST MIDDLESEX HOSPITAL. House OFFICER (Orthopædic Unit—58 Beds). Post vacant now. Recognised for F.R.C.S.

Applications, stating age, qualifications and experience, with copies of up to 2 recent testimonials, to Group Secretary, South West Middlesex Hospital Management Committee, West Middlesex Hospital, Isleworth, by 21st May.

KINGSTON HOSPITAL, Wolverton-avenue, Kingston-ON-THAMES. KINGSTON GROUP HOSPITAL MANAGEMENT COMMITTEE. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited from suitably qualified medical officers for the post of REGISTRAR (obstetrics and gynæcology) which will be available on 1st July, 1957. The post is recognised for the M.R.C.O.G.

Forms of application are obtainable from the Group Secretary, 35, Coombe-road, Kingston, and should be returned to him within 10 days of the appearance of this advertisement (a foolscap stamped addressed envelope to be enclosed).

KIDDERMINSTER AND DISTRICT GENERAL HOS-PITAL, WORCESTERSHIRE. (112 Beds.) Applications are invited for the pre-registration post of HOUSE OFFICER (House Surgeon) at the above Hospital. Post vacant now. Married accommodation available.

Applications, with the names of 3 referees, to the Hospital Secretary.

KIDDERMINSTER AND DISTRICT GENERAL HOS-PITAL, WORCESTERSHIRE. (112 Beds.) Applications are invited for the pre-registration post of HOUSE OFFICER (House Surgeon) at the above Hospital. Post vacant immediately.

Applications, with the names of 3 referees, to the Hospital Secretary.

KIDDERMINSTER AND DISTRICT GENERAL HOS-PITAL, WORCESTERSHIRE. (112 Beds.) Applications are invited for the pre-registration post of HOUSE OFFICER (House Physician) at the above Hospital. Post vacant July, 1957.

Applications, with the names of 3 referees, to the Hospital Secretary.

LEEDS REGIONAL HOSPITAL BOARD. Registrar vacancies.

General Surgery

(i) Huddersfield Group (100 general surgical beds). Residential accommodation available. Duties mainly at Huddersfield Royal Infirmary. Recognised for F.R.C.S. May include some duties in the Casualty Department.

(ii) Harrogate and District General Hospital (74 general surgical beds), preferably resident. Recognised for F.R.C.S.

Obstetrics and Gynæcology

Wakefield A and B Groups (with occasional duties in Pontefract and Castleford Groups). Married accommodation available. Aggregate of 81 obstetric and 46 gynæcological beds.

Ophthalmology

(i) Huddersfield Group (23 eye beds and 1500 new outpatients annually). Non-resident.

(ii) Halifax and Bradford A Groups duties divided between Halifax Group (11 eye beds and 1700 new outpatients annually), and Bradford A Group (34 eye beds and 5200 new outpatients annually). Non-resident.

Psychiatry

Menston Hospital, near Leeds (2500 Beds). If desired, facilities for attendance at Leeds University will be provided if the successful candidates are studying for the D.P.M.

Applications, stating age, qualifications and details of present and previous appointments with dates, together with the names and addresses of 3 referees, to the Secretary, Joint Registrars Committee, Park-parade, Harrogate, by 16th May, 1957.

LEEDS. THE UNITED LEEDS HOSPITALS. The GENERAL INFIRMARY AT LEEDS. RESIDENT RADIOTHERAPY OFFICER (Senior House Officer status), required, for a period of 6 months. The post affords facilities for training for D.M.R.T. Conditions of service for hospital medical staff apply.

Applications, stating age, qualifications, previous posts with dates, and 3 names for reference, should be sent to the Secretary to the Board, as soon as possible.

LEICESTER ISOLATION HOSPITAL AND CHEST UNIT, Groby-road, LEICESTER. (328 Beds.) Applications are invited for the appointment of RESIDENT SENIOR HOUSE OFFICER (surgical). Salary £745 p.a., less £150 residential emoluments. The appointment is tenable for 6 months, and may be extended for a further period of 6 months. Experience will be gained in all branches of thoracic surgery, including cardiac surgery. The post is recognised for the Final Fellowship.

Applications, giving age, qualifications, dates, &c., and copies of 2 recent testimonials, to be forwarded as soon as possible to the Department of Thoracic Surgery at the above Hospital.

LIVERPOOL, 9. WALTON HOSPITAL. Senior House OFFICER in Diseases of the Chest, vacant now. Opportunity for experience in tuberculous and non-tuberculous chest diseases, in thoracic surgery, and clinic practice.

Apply to Physician-Superintendent, stating age, experience, qualifications, names of 2 referees, and date available for duty.

LOUTH COUNTY HOSPITAL. (215 Beds.) Sheffield REGIONAL HOSPITAL BOARD. Whole-time RESIDENT or NON-RESIDENT REGISTRAR (orthopædics and casualty) required. Appointment for 1 year in first instance.

Apply to Secretary, Sheffield Regional Hospital Board, Old Fulwood-road, Sheffield, by 20th May, 1957, giving age, nationality, qualifications, present and previous appointments with dates, naming 3 referees.

MAIDENHEAD HOSPITAL, Berkshire. Applications invited for post of SENIOR HOUSE OFFICER (casualty) vacant 22nd May. Post recognised for F.R.C.S.

Applications, stating age, qualifications, experience and nationality, with copies of testimonials or names of 3 referees, to Secretary.

MAIDSTONE. WEST KENT GENERAL HOSPITAL. (141 Beds.) MID-KENT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the pre-registration post of HOUSE SURGEON. 6 months appointment. Post vacant now. Salary at the rate of £467 10s.–£577 10s. p.a. A deduction at the rate of £125 a year is made for board and lodging, and other services provided.

Applications should be forwarded, as soon as possible, to the Administrative Officer at the Hospital.

MEXBOROUGH. MONTAGU HOSPITAL AND ANNEXE. (198 Beds—22 obstetrics, 15 gynæcology.) SENIOR HOUSE OFFICER (obstetrics and gynæcology) required. Residential emoluments £150 p.a.

Applications to Secretary, Hospital Management Committee, "Fern Bank," Doncaster-road, Rotherham.

MEXBOROUGH. MONTAGU HOSPITAL AND ANNEXE. (198 Beds—22 obstetrics, 15 gynæcology.) Locum SENIOR HOUSE OFFICER (obstetrics and gynæcology) required immediately. Residential emoluments £150 p.a.

Applications to Secretary, Hospital Management Committee, "Fern Bank," Doncaster-road, Rotherham.

MEXBOROUGH. MONTAGU HOSPITAL (168 Beds), AND SANDYGATE HOUSE ANNEXE (30 Beds). Locum SENIOR HOUSE OFFICER (casualty and orthopædics) required immediately. Residential emoluments £150 p.a.

Applications to the Secretary, Hospital Management Committee, "Fern Bank," Doncaster-road, Rotherham.

MORECAMBE. QUEEN VICTORIA HOSPITAL. Senior HOUSE OFFICER (obstetrics and gynæcology). Post vacant early June.

Applications, with names of 2 referees, to Group Secretary, Royal Lancaster Infirmary.

MORECAMBE. QUEEN VICTORIA HOSPITAL. (100 Beds.) RESIDENT CASUALTY OFFICER (Junior Hospital Medical Officer grade) required for normal period of 1 year. Post vacant early June.

Applications, with names of 2 referees, to Group Secretary, Royal Lancaster Infirmary, Lancaster.

MANCHESTER. BOOTH HALL AND MONSALL HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER (pathology) resident, for Group Pathological Laboratory. Salary £745 p.a., less £150 p.a. for residence. Post tenable for 1 year in the first instance.

Applications to be sent as soon as possible to Group Secretary, Booth Hall Hospital, Manchester 9, from whom further particulars may be obtained.

MANCHESTER. BOOTH HALL CHILDREN'S HOSPITAL, BLACKLEY, MANCHESTER, 9. (380 Beds. Recognised for D.C.H.) RESIDENT SENIOR HOUSE OFFICER (surgical).

Applications, giving names and addresses of 2 referees, to be sent to Group Secretary, from whom further particulars may be obtained.

MANCHESTER, 19. DUCHESS OF YORK HOSPITAL FOR BABIES. SOUTH MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. There will be a vacancy at the above Hospital, which is associated with the Manchester University for teaching purposes, for a RESIDENT HOUSE OFFICER (Male or Female), post- or second pre-registration, for 6 months commencing 21st July.

Applications, with copies of 3 testimonials, to be sent to the Administrative Officer at the above address.

MANCHESTER, 19. DUCHESS OF YORK HOSPITAL FOR BABIES. SOUTH MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER required for 12 months commencing 8th July. Post is senior of 3, D.C.H. or M.R.C.P. an advantage but not essential. The Hospital is associated with the University Department of Child Health for teaching purposes.

Applications, with full details together with the names of 2 referees, to the Group Secretary, Withington Hospital, Manchester, 20.

MANCHESTER, 8. CRUMPSALL HOSPITAL. Applications are invited for the post of REGISTRAR in Medicine (Resident Medical Officer). The clinical teaching of undergraduates takes place on the medical side of the Hospital.

Applications, with names of 2 referees, by 20th May, 1957, to Group Secretary, North Manchester Hospital Management Committee, Crumpsall Hospital, Manchester, 8.

MANCHESTER REGIONAL HOSPITAL BOARD. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. WITHINGTON HOSPITAL, MANCHESTER, 20. The Board invites applications for the post of REGISTRAR in Pathology, Group Laboratory, Withington Hospital (1088 Beds). The laboratory is recognised for the D.Path. examination, and facilities are available for training in all branches of clinical pathology.

Applications, stating age, qualifications, present post, experience, and names of 2 referees, to be forwarded to the Group Secretary, Withington Hospital, Manchester, 20.

MANCHESTER REGIONAL HOSPITAL BOARD. Applications are invited for the whole-time post of REGISTRAR in General Surgery (recognised for F.R.C.S.(Eng.)) in the Ashton, Hyde and Glossop Group of hospitals.

Applications, stating age, nationality, qualifications and experience, with copies of 2 references, should be forwarded to the Group Secretary, Ashton-under-Lyne General Hospital, Ashton-under-Lyne, Lancashire, as soon as possible.

MANCHESTER REGIONAL HOSPITAL BOARD. Senior REGISTRAR in Obstetrics and Gynæcology in the North Manchester Group of hospitals (mainly Crumpsall Hospital). Arrangements may later be made for the successful applicant to undertake a period of service in the United Manchester Hospitals (St. Mary's Hospitals).

Forms of application obtainable from the Senior Administrative Medical Officer of the Board, Cheetwood-road, Manchester, 8, should be returned by 27th May, 1957.

MANCHESTER VICTORIA MEMORIAL JEWISH HOSPITAL. (Non-Sectarian—104 Beds.) Applications are invited for the resident post of SENIOR HOUSE OFFICER in Surgery, to act as Deputy Resident Surgical Officer. Recognised for F.R.C.S. Vacant 11th July, 1957.

Applications, with names of 2 referees, by 20th May, 1957, to Group Secretary, North Manchester Hospital Management Committee, Crumpsall Hospital, Manchester, 8.

MANCHESTER, 20. WITHINGTON HOSPITAL. South MANCHESTER HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (surgical) including casualty duties, vacant immediately. The post is recognised by the Royal College of Surgeons for the Final F.R.C.S. examination and possession of the primary F.R.C.S. will be an advantage. The Hospital is recognised by the Manchester University for the teaching of undergraduate students.

Applications, with full details, to the Group Secretary, Withington Hospital, immediately.

MANCHESTER. UNITED MANCHESTER HOSPITALS. SAINT MARY'S HOSPITALS, MANCHESTER. Applications are invited for the post of SENIOR HOUSE OFFICER in Obstetrics—1st June, 1957. Applicants must have had previous hospital experience in general medicine and surgery, and in obstetrics, and preferably with not less than 12 months in obstetrics and gynæcology. The post is recognised for the purposes of the M.R.C.O.G. examination. The duties involve clinical responsibility for mothers and babies and supervision of the work of pre-registration House Officers is also included. The appointment is for 12 months. National scale.

Application forms may be obtained from the undersigned and returned not later than 17th May, 1957.

A. R. WISE, General Superintendent.

Saint Mary's Hospitals, Whitworth Park, Manchester, 13.

MANCHESTER. UNITED MANCHESTER HOSPITALS. MANCHESTER ROYAL EYE HOSPITAL. Applications are invited for the following posts :—

SENIOR HOUSE OFFICER.

HOUSE OFFICER (pre-registration surgical post).

Application forms may be obtained from the undersigned.

H. R. NORTH, General Superintendent.

Manchester Royal Eye Hospital.

MANCHESTER. UNITED MANCHESTER HOSPITALS. MANCHESTER ROYAL INFIRMARY, MANCHESTER, 13. REGISTRAR to the Department of Diagnostic Radiology, to commence as soon as possible. Whole-time non-resident appointment for 12 months, renewable.

Application form obtainable from the undersigned, to be returned not later than 25th May, 1957.

G. H. TAYLOR, Secretary.

MANCHESTER. UNITED MANCHESTER HOSPITALS AND MANCHESTER REGIONAL HOSPITAL BOARD. SENIOR REGISTRAR in Surgery, to commence as soon as possible. Whole-time non-resident appointment for 12 months, renewable, commencing at the Manchester Royal Infirmary in the Surgical Professorial Unit. Applicants must possess a higher qualification. Arrangements may eventually be made for the successful candidate to transfer to 1 of the Manchester Regional Hospitals to continue training.

Application form obtainable from the undersigned, to be returned by 25th May, 1957.

F. J. CABLE, Secretary to the Board of Governors.

United Manchester Hospitals, Manchester Royal Infirmary, Manchester, 13.

MARKET DRAYTON (near), SHROPSHIRE. CHESHIRE JOINT SANATORIUM. (305 Beds.) RESIDENT MEDICAL OFFICER (Junior Hospital Medical Officer or Senior House Officer, according to experience). The post offers exceptional experience in the treatment of pulmonary tuberculosis.

Applications to the Medical Superintendent at the Sanatorium.

NORTHWOOD, MIDDLESEX. MOUNT VERNON HOSPITAL. Applications are invited for the post of CASUALTY OFFICER (Senior House Officer) recognised by the Royal College of Surgeons. Vacant 1st June. A LOCUM is required from now until 1st June.

Please ring the Resident Medical Officer, Mount Vernon Hospital (Northwood 3281).

NORTHWOOD, MIDDLESEX. MOUNT VERNON HOSPITAL. Applications are invited for the post of HOUSE SURGEON for general surgery. Recognised for the Final F.R.C.S. in general surgery, and recognised as a pre-registration appointment.

Applications, accompanied by 2 testimonials, to be forwarded to the Resident Medical Officer, Mount Vernon Hospital, Northwood, Middlesex, by 18th May, 1957.

NORTHWOOD, MIDDLESEX. MOUNT VERNON HOSPITAL. Applications are invited for the post of HOUSE SURGEON mainly orthopædic and genito-urinary surgery. This is a pre-registration appointment.

Applications, accompanied by 2 testimonials, to be forwarded to the Resident Medical Officer, Mount Vernon Hospital, Northwood, Middlesex, by 18th May, 1957.

NORTHWOOD, MIDDLESEX. MOUNT VERNON HOSPITAL. Applications are invited for the post of HOUSE PHYSICIAN for general medicine and neurology, vacant 1st June. This post is recognised as a pre-registration appointment.

Applications, accompanied by 2 testimonials, to be forwarded to the Resident Medical Officer, Mount Vernon Hospital, Northwood, Middlesex, by 18th May, 1957.

NORTHWOOD, MIDDLESEX. MOUNT VERNON HOSPITAL. Applications are invited for the post of HOUSE PHYSICIAN to the Radiotherapy Department. This post is recognised as a pre-registration appointment.

Applications, accompanied by 2 testimonials, to be forwarded to the Resident Medical Officer, Mount Vernon Hospital, Northwood, Middlesex, by 18th May, 1957.

NORWICH. NORFOLK AND NORWICH HOSPITAL. Locum ANÆSTHETIST (Senior House Officer status) required from 27th May to 31st July, 1957. Salary £15 19s. per week in accordance with terms and conditions of service of hospital medical staff. Membership of a Medical Defence Society is a condition of appointment.

Applications, giving full details together with names of 2 referees, to Group Secretary, Hospital Management Committee, St. Stephen's-road, Norwich.

NOTTINGHAM. CITY HOSPITAL. (811 Beds.) Applications are invited for the post of HOUSE SURGEON, vacant 15th May, 1957. Recognised for pre-registration purposes.

Applications, stating age, nationality, qualifications, and experience, together with copies of not more than 3 testimonials, to be sent to the Hospital Secretary, City Hospital, Hucknall-road, Nottingham.

NOTTINGHAM. CITY HOSPITAL. (811 Beds.) Applications are invited for the post of SENIOR HOUSE OFFICER at the Department of Thoracic Surgery. Post vacant immediately. Salary £819 10s. p.a., less £150 for residential emoluments. The appointment will be for 1 year.

Applications, stating age, nationality, qualifications, and experience, together with copies of not more than 3 testimonials, to be submitted immediately to the Hospital Secretary, City Hospital, Hucknall-road, Nottingham.

NOTTINGHAM. CITY HOSPITAL. Plastic Surgery, JAW INJURIES AND BURNS CENTRE. SENIOR HOUSE OFFICER in Plastic Surgery. Previous experience in specialty not essential. The successful candidate will receive a thorough training in plastic surgery and burns. Hospital intakes from Nottingham and Derby areas. Salary £819 10s., less £150 board-residence. Post vacant 20th May, 1957.

Applications, together with copies of 3 testimonials, should be forwarded to the Hospital Secretary, Hucknall-road, Nottingham.

NOTTINGHAM GENERAL HOSPITAL. Resident Pre-registration HOUSE PHYSICIANS required during June.

Applications, stating age, qualifications and nationality, together with copies of testimonials, to be sent to the Group Secretary.

NOTTINGHAM GENERAL HOSPITAL. Resident pre-registration or registered HOUSE SURGEONS required : one 26th May, others June.

Applications, stating age, qualifications and nationality together with copies of testimonials, to be sent to the Group Secretary.

NEWCASTLE REGIONAL HOSPITAL BOARD.

REGISTRAR SURGEON (whole-time), Gateshead Group of hospitals for Dunston Hill Hospital, resident, single accommodation available.

REGISTRAR OBSTETRICIAN AND GYNÆCOLOGIST (whole-time), resident, for duties at Dilston Hall Maternity Home, Hexham (50 Beds), and Newcastle General Hospital (100 obstetrical and gynæcological beds). Initial appointment at Dilston Hall. Post recognised for M.R.C.O.G., and Newcastle General Hospital is a teaching unit.

Applications, with names and addresses of 3 referees, to Senior Administrative Medical Officer, Regional Hospital Board, Benfield-road, Newcastle upon Tyne, 6, within 14 days.

NEWTON ABBOT HOSPITAL. (General Section 65 Beds.) RESIDENT SENIOR HOUSE SURGEON (Male or Female) required 8th June, 1957. Married quarters available.

Applications (quoting Ref. F.364/38), stating qualifications, nationality, age, with copy testimonials, to be sent to the Group Secretary, Torquay District Hospital Management Committee, Torbay Hospital, Torquay, S. Devon.

OXFORD. UNITED OXFORD HOSPITALS. Applications invited for post of EMERGENCY OFFICER in the United Oxford Hospitals for 2 months with effect from 1st June, 1957. Post graded as Senior House Officer for suitable applicant.

Applications, stating age, qualifications and experience, together with the names of 2 referees, to the Administrator, Radcliffe Infirmary, Oxford, not later than 23rd May.

PLYMOUTH. SOUTH DEVON AND EAST CORNWALL HOSPITAL.

SENIOR HOUSE OFFICER in Medicine, vacant 12th June, 1957.

SENIOR HOUSE OFFICER in Casualty, vacant 1st July, 1957. Recognised for the F.R.C.S. Central Casualty Department of the South Devon and East Cornwall Hospital, Freedom Fields, Plymouth.

HOUSE PHYSICIANS (pre-registration posts), vacancies (2) 1st July, 1957. Freedom Fields Section.

HOUSE SURGEON (pre-registration post), vacant 23rd July, 1957. Recognised for the F.R.C.S. Freedom Fields Section.

HOUSE SURGEONS (pre-registration posts), vacancies 9th June, 1st and 5th July, 1957. Recognised for the F.R.C.S. Greenbank Road Section.

HOUSE SURGEON (pre-registration post), vacant 1st July, 1957. Recognised for the F.R.C.S. Devonport Section.

Applications, stating age, nationality, and experience, with names of 3 referees, to be sent to—

F. HALL, Deputy Group Secretary, Plymouth, South Devon and East Cornwall General Hospital Group, 7, Nelson-gardens, Stoke, Plymouth.

PLYMOUTH, SOUTH DEVON AND EAST CORNWALL GENERAL HOSPITAL GROUP. AREA PATHOLOGICAL DEPARTMENT. Applications invited from duly qualified and registered medical practitioners for the appointment of RESIDENT SENIOR HOUSE OFFICER in Pathology, vacant May. The appointment will be for a period of 12 months in the Area Laboratory at the South Devon and East Cornwall Hospital, Greenbank Road, Plymouth, which provides excellent modern working facilities.

Applications, stating age, nationality, qualifications and experience, together with the names and addresses of 3 referees, to be sent to the undersigned as soon as possible.

F. HALL, Deputy Group Secretary.
7, Nelson-gardens, Stoke, Plymouth.

PLYMOUTH. MOUNT GOLD HOSPITAL. Senior HOUSE SURGEON for the Orthopædic Hospital and Fracture Service, centring on Mount Gold Hospital and associated hospitals. Post recognised by the R.C.S. Vacancy early in June.

Applications, stating age, qualifications with dates, &c., and with copies of 2 recent testimonials, to be forwarded to the Secretary, Mount Gold Hospital, Plymouth.

POOLE GENERAL HOSPITAL, Longfleet-road, Poole, DORSET. BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of HOUSE PHYSICIAN (pre-registration), which becomes vacant on 7th June.

Applications to the Hospital Secretary.

POOLE GENERAL HOSPITAL, Longfleet-road, Poole, DORSET. BOURNEMOUTH AND EAST DORSET HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the appointment of HOUSE SURGEON (pre-registration). The post, which becomes vacant on 10th June, is recognised for the F.R.C.S. and F.R.C.S.E.

Applications to the Hospital Secretary.

PORTSMOUTH GROUP HOSPITAL MANAGEMENT COMMITTEE.

Royal Portsmouth Hospital (70 surgical beds)
SENIOR HOUSE SURGEON, vacant now.

Applications, stating age, experience, and qualifications, together with the names of 2 referees, should be forwarded as soon as possible to E. H. HURST.

St. Mary's Hospital, Milton-road, Portsmouth.

REDHILL. EAST SURREY HOSPITAL, Shrewsbury-road, REDHILL, SURREY. SENIOR HOUSE OFFICER (Male), mainly surgical. Post vacant immediately.

Apply to the Hospital Secretary.

REDHILL COUNTY HOSPITAL. Resident House SURGEON. Post vacant June and July, recognised for pre-registration and F.R.C.S., with prospects of House Physician's appointment to follow.

Apply to Group Secretary, Redhill Hospital Management Committee, Pendleton-road, Redhill, Surrey.

REDHILL COUNTY HOSPITAL. Locum Medical REGISTRAR required for 2 weeks from 20th May.

Apply to the Group Secretary, Redhill Hospital Management Committee, Earlswood Mount, Pendleton-road, Redhill, Surrey (phone : Redhill 3581, ext. 20).

REDHILL COUNTY HOSPITAL. Senior House Officer (anæsthetics). Post vacant mid-June, recognised for F.F.A. R.C.S. and D.A. 1 year appointment, renewable.

Apply to Group Secretary, Redhill Hospital Management Committee, Earlswood Mount, Pendleton-road, Redhill, Surrey (phone : Redhill 3581, ext. 20).

READING AREA DEPARTMENT OF MEDICINE. Applications are invited from registered and provisionally registered medical practitioners for 2 posts as RESIDENT HOUSE PHYSICIAN, vacant 1st June, 1957, for a period of 6 months. Successful candidates will be required to carry out duties at the following Reading Hospitals : Royal Berkshire Hospital (398 Beds), Battle (374 Beds), and Prospect Park (104 Beds).

Write immediately, stating age, qualifications with dates, nationality, present post, with copies of 2 recent testimonials, to Secretary, Royal Berkshire Hospital, Reading.

READING. BATTLE HOSPITAL. (391 Beds.) Applications are invited from registered medical practitioners for the post of RESIDENT JUNIOR HOUSE SURGEON in the Accident and Orthopædic Department. Post vacant 2nd June, 1957. F.R.C.S. recognised. Also casualty duties.

Apply, stating age, qualifications with dates, nationality, present post, with 1 copy of recent testimonial, to Hospital Secretary.

READING. ROYAL BERKSHIRE HOSPITAL. (398 Beds.) Applications are invited from registered and provisionally registered medical practitioners, Male and Female, for resident post of HOUSE SURGEON, vacant 1st June, 1957, and tenable for 6 months.

Write, before 15th May, stating age, qualifications with dates, nationality, present post, with copies of 2 recent testimonials, to Secretary.

READING. ROYAL BERKSHIRE HOSPITAL. (339 Beds.) READING AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. Applications are invited from registered medical practitioners (Male or Female) for the appointment of a SENIOR HOUSE OFFICER (anæsthetics), vacant from 1st May, 1957, for a period of 1 year. Post recognised for F.F.A.R.C.S. Salary £745 p.a., less £150 for board-residence.

Write, stating age, qualifications with dates, nationality and present post, together with the names of 3 referees, to the Group Secretary, Reading and District Hospital Management Committee, 3, Craven-road, Reading.

RICHMOND, SURREY. ROYAL HOSPITAL. (Acute General Hospital—121 Beds.) Applications are invited for the following posts :—

Pre-registration HOUSE PHYSICIAN. Post vacant on 29th May, 1957.

Pre-registration HOUSE SURGEON. Post vacant on 17th May, 1957.

Please apply immediately to the Administrative Officer.

ROCHDALE INFIRMARY. Senior House Officer (anæsthetics) required.

Applications, with names and addresses of 2 referees and full particulars, to Group Secretary, Central Offices, Birch Hill Hospital, Rochdale, Lancs, as soon as possible.

ROCHFORD, ESSEX. GENERAL HOSPITAL. (622 Beds.) Applications are invited from pre-registration candidates for a 6 months appointment of HOUSE SURGEON (recognised for F.R.C.S.) to be followed subject to satisfactory service, by a 6 months appointment as HOUSE OFFICER (obstetrics) recognised for D.Obst.R.C.O.G. Post vacant 25th May, 1957.

Applications, accompanied by 1 testimonial, to reach the undersigned by 22nd May, 1957. J. C. FIELD, Secretary.

ROCHFORD, ESSEX. GENERAL HOSPITAL. (622 Beds.) Applications are invited from pre-registration candidates for a 6 months appointment of HOUSE SURGEON (recognised for F.R.C.S.) at the above Hospital. Post vacant 1st June, 1957.

Applications, &c. (1 testimonial only necessary from pre-registration applicants seeking first appointment) to be sent to the undersigned by 24th May, 1957.

J. C. FIELD, Secretary.

ROMFORD, ESSEX. OLDCHURCH HOSPITAL. (722 Beds.) ORTHOPÆDIC HOUSE SURGEON (resident) required in the Orthopædic and Accident Unit from 17th June, 1957. The service consists of 100 beds equally divided between traumatic surgery and "cold" orthopædics. Post is recognised for pre-registration purposes and for F.R.C.S.

Applications to be sent to Group Secretary, Romford Hospital Management Committee, Oldchurch Hospital, as soon as possible.

ROMFORD, ESSEX. OLDCHURCH HOSPITAL. (722 Beds.) RESIDENT HOUSE SURGEONS (2) required immediately in the General Surgical Unit. Recognised for F.R.C.S. Open to either pre-registration applicants or to fully qualified practitioners. This very active Unit of a total of approximately 180 Beds affords ample opportunities for candidates to obtain first-class tuition and experience. The candidates appointed will be attached to a unit of approximately 60 Beds.

Applications should be forwarded immediately to the Group Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital, Romford.

ROMFORD, ESSEX. OLDCHURCH HOSPITAL. (722 Beds.) SENIOR HOUSE OFFICER (neurosurgery) required from 21st June, 1957. Suitable for candidates seeking higher medical or surgical qualifications. Recognised for the F.R.C.S. (Eng.).

Apply to Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital, Romford, as soon as possible.

ROMFORD, ESSEX. RUSH GREEN HOSPITAL. (301 Beds.) GYNÆCOLOGICAL HOUSE SURGEON (Male or Female), required. Unit comprises 35 gynæcological and 6 maternity beds. Resident post open to either pre-registration applicants or to fully qualified practitioners. Appointment includes certain relief duties on the medical side.

Applications to Medical Superintendent as soon as possible. Hospital may be seen by arrangement (Tel. Romford 7711).

ROMFORD, ESSEX. VICTORIA HOSPITAL. (99 Beds.) RESIDENT HOUSE SURGEON (Male) required immediately. (Not pre-registration appointment.)

Applications should be forwarded to the Secretary, Romford Group Hospital Management Committee, Oldchurch Hospital, Romford.

ROMFORD GROUP HOSPITAL MANAGEMENT COMMITTEE. CLINICAL ASSISTANT required on the staff of the Regional Ophthalmic Centre at Oldchurch Hospital, Romford, to undertake 1 outpatient session per week in the Eye Clinic at Connaught Hospital, Chingford (Wednesday afternoons).

Applications to be sent to Group Secretary, Oldchurch Hospital, Romford, as soon as possible.

SCOTLAND. EASTERN REGIONAL HOSPITAL BOARD. Pædiatrics. DUNDEE GENERAL HOSPITALS. Applications are invited for the post of REGISTRAR in Pædiatrics at Dundee Royal Infirmary (534 Beds) and Maryfield Hospital (370 Beds), the main teaching hospitals associated with the University of St. Andrews. The duties will include teaching of undergraduates. Salary and conditions of service in accordance with national agreement.

Further particulars and forms of application from the Secretary to the Board, "Bracknowe," 430, Blackness-road, Dundee, with whom applications must be lodged not later than 25th May, 1957.

SCOTLAND. EASTERN REGIONAL HOSPITAL BOARD. Psychiatry. PERTHSHIRE MENTAL HOSPITAL. Applications are invited for appointments as REGISTRAR (preferably resident) in Psychiatry at the Perthshire Mental Hospitals—Murray Royal, Perth (260 Beds), and Murthly Hospital, Perthshire (460 Beds). House available. Salary and conditions of service in accordance with national agreement.

Forms of application and further particulars may be had from the Secretary to the Board, "Bracknowe," 430, Blackness-road, Dundee, with whom applications must be lodged not later than 25th May, 1957.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. REGISTRAR in Medical Pædiatrics to the Edinburgh Northern Group of hospitals. The duties of the post will be in the Western General Hospital, Leith Hospital, and the newborn nurseries in the Eastern General Hospital, and the successful candidate will be required to assist in undergraduate teaching.

Apply, giving particulars of age, qualifications and previous experience, and the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 1st June.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. REGISTRAR in Orthopædic Surgery to the West Fife Group of hospitals, based on the Dunfermline and West Fife Hospital.

Apply, giving particulars of age, qualifications and previous experience, and the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 1st June, 1957.

SCOTLAND. SOUTH-EASTERN REGIONAL HOSPITAL BOARD. REGISTRAR at Stratheden Hospital, Cupar, Fife. During the tenure of the post opportunities for interchange of duty and training at other centres in the Region may be available under the joint training scheme of the South-Eastern Regional Hospital Board and the Department of Psychological Medicine of the University of Edinburgh. Residence is available.

Apply, giving particulars of age, qualifications and previous experience, and the names of 2 referees, to the Secretary, 11, Drumsheugh-gardens, Edinburgh, 3, by 1st June.

SCOTLAND. WESTERN REGIONAL HOSPITAL BOARD. Applications are invited for the following appointments, which will be for 1 year in the first instance :—

SENIOR REGISTRAR in Pædiatrics based at Stobhill General Hospital, Glasgow.

SENIOR REGISTRAR in Radiotherapy based at the Western Infirmary, Glasgow.

Applications (12 copies), stating date of birth, qualifications, experience, present appointment, and the names of 3 referees, to reach the Secretary, Western Regional Hospital Board, 64, West Regent-street, Glasgow, C.2, by 25th May, 1957.

SALISBURY GENERAL HOSPITAL. Applications are invited for the appointment of REGISTRAR to the E.N.T. Department. Post recognised for D.L.O. and F.R.C.S.

Application forms obtainable from, and returnable to, Group Secretary, Salisbury Group Hospital Management Committee, Odstock Hospital, Salisbury, Wilts.

SALISBURY GENERAL HOSPITAL. Applications are invited for the appointment of RESIDENT HOUSE SURGEON to the Obstetric and Gynæcological Department which becomes vacant on 1st July, 1957. The post is open to pre-registration candidates and is recognised for the Diploma and Membership of the Royal College.

Apply, stating age, nationality, qualifications, experience and giving names and addresses of 2 referees, to Group Secretary, Salisbury Group Hospital Management Committee, Odstock Hospital, Salisbury.

SALISBURY GENERAL HOSPITAL. Applications are invited for the appointment of RESIDENT HOUSE SURGEON/HOUSE PHYSICIAN to run consecutively in this order from 1st July, 1957, for a period of 6 months in each post. The post is open to pre-registration candidates.

Apply, naming 2 referees, to Group Secretary, Salisbury Group Hospital Management Committee, Odstock Hospital, Salisbury.

SHEFFIELD. CITY GENERAL HOSPITAL. Department OF PATHOLOGY GROUP LABORATORY. Applications are invited for the appointment of SENIOR HOUSE OFFICER (clinical pathology). Resident accommodation is available and optional. Opportunities for training in morbid anatomy, biochemistry, hæmatology and bacteriology. The work of this and the associated hospitals offers excellent experience to graduates who wish to make pathology their permanent career. The post is recognised for the D.Path.

Apply, giving details of age, qualifications, present and previous appointments with dates, and the names of 2 persons to whom reference may be made, to the Group Secretary, Nether Edge Hospital, Sheffield, 11.

SHEFFIELD. THE UNITED SHEFFIELD HOSPITALS. ROYAL INFIRMARY. Applications invited for the following posts:—

(*a*) NON-RESIDENT SENIOR HOUSE OFFICER in General Medicine. Post vacant 15th July.

Closing date for applications 18th May.

(*b*) Locum HOUSE OFFICER or SENIOR HOUSE OFFICER for the Neurosurgical Department, for the period to 15th July, 1957. No previous experience in neurosurgery necessary.

Applications to be sent at once.

Applications for the above posts should state age, qualifications and experience, give the names of 3 referees, and be sent to the Superintendent, Royal Infirmary, Infirmary-road, Sheffield, 6.

SHREWSBURY. ROYAL SALOP INFIRMARY AND COPTHORNE HOSPITAL. (500 Beds.) SENIOR HOUSE OFFICER (gynæcological). 50 gynæcological beds and 2 House Surgeons. Post recognised for M.R.C.O.G. Vacant 1st June, 1957.

Applications, with copy testimonials, to Group Secretary, Shrewsbury Hospital Group, Royal Salop Infirmary, Shrewsbury.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. Locum SENIOR HOUSE OFFICER (casualty) required 27th May–16th June, working with Registrar in busy Casualty Department. Experience provided in orthopædic and plastic cases.

Applications, with names of 2 referees, to Secretary.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. ANÆSTHETIC REGISTRAR (resident), required, with duties at other hospitals in the Group. Post recognised for D.A. and F.F.A.R.C.S.

Forms of application from, and returnable to, Secretary, Windsor Hospital Management Committee, Alma-road, Windsor, by 19th May.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. WINDSOR GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications invited for post of HOUSE SURGEON, 1 of 2, vacant 22nd May. Pre-registration post.

Applications, with names of 2 referees, to Secretary by 14th May.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. Locum RESIDENT ANÆSTHETIC REGISTRAR required from 13th May.

Applications, with names of 2 referees, to Secretary.

SLOUGH, BUCKINGHAMSHIRE. UPTON HOSPITAL. Locum MEDICAL REGISTRAR required 18th–31st May.

Applications, with names of 2 referees, to Secretary.

SOUTHAMPTON GENERAL HOSPITAL. (471 Beds.) RESIDENT HOUSE SURGEON required. Pre-registration candidates eligible.

Applications, with copies of recent testimonials, should be forwarded to Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON GROUP HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (anæsthetics) for the Anæsthetic Department of the Southampton Group of hospitals. Special facilities for working for F.F.A.R.C.S. and D.A.

Applications, with copies of testimonials, should be forwarded as soon as possible to the Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHAMPTON. ROYAL SOUTH HANTS HOSPITAL. (278 Beds.) ORTHOPÆDIC HOUSE SURGEON required. Post recognised for Pre-registration Service and tenable for 6 months. The Hospital is the centre to which all trauma from a large industrial town and port is directed thus providing excellent experience in the treatment of traumatic conditions; patients with orthopædic conditions are also drawn from a wide area.

Applications, with copies of testimonials, should be sent as soon as possible to the Group Secretary, Southampton Group Hospital Management Committee, Bullar-street, Southampton.

SOUTHPORT GENERAL INFIRMARY. Temporary Casualty Post. JUNIOR HOSPITAL MEDICAL OFFICER (resident). Whole-time casualty appointment for either normal term of 12 months or on temporary day-to-day basis.

Apply to Group Secretary, Southport and District Hospital Management Committee, Promenade Hospital, Southport.

STOKE-ON-TRENT. CITY GENERAL HOSPITAL. (845 Beds. Recognised for F.F.A. R.C.S. and D.A.) STOKE-ON-TRENT HOSPITAL MANAGEMENT COMMITTEE. SENIOR HOUSE OFFICER in Anæsthetics. Previous anæsthetic experience desirable, but not essential. This post offers experience in anæsthesia for all types of general surgery, thoracic and cardiac surgery, including an Obstetric Unit of 60 Beds. Staff includes a Senior Registrar who shares in emergency duties.

Applications, with copy testimonials, to the Group Secretary, Stoke-on-Trent Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. (455 Beds.) SENIOR HOUSE OFFICER (ophthalmology) required. Recognised F.R.C.S. and D.O.

Applications to Group Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOKE-ON-TRENT. NORTH STAFFORDSHIRE ROYAL INFIRMARY. (455 Beds.) SENIOR HOUSE OFFICER for Casualty Department dealing with over 20,000 new cases per year. Post offers first-class experience and is recognised for F.R.C.S. Resident or non-resident.

Detailed applications to Secretary, Hospital Management Committee, Princes-road, Stoke-on-Trent.

STOCKPORT INFIRMARY. (163 Beds.) Applications are invited for the resident post of HOUSE OFFICER or SENIOR HOUSE OFFICER (medicine).

Applications, stating age, experience and qualifications, together with copies of 2 testimonials, to be addressed to the Group Secretary, Stockport and Buxton Hospital Management Committee, 59B, Shaw-heath, Stockport.

STOCKPORT. STEPPING HILL HOSPITAL. (531 Beds.) STOCKPORT AND BUXTON HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER (anæsthetics). The post is recognised for the D.A. and F.F.A.R.C.S. and there are facilities for study.

Applications, stating age, experience and qualifications, together with copies of 2 testimonials, to be addressed to the Secretary, Stockport and Buxton Hospital Management Committee, 59B, Shaw-heath, Stockport.

ST. HELENS AND DISTRICT HOSPITAL MANAGE-MENT COMMITTEE. Applications are invited for the post of CASUALTY OFFICER in the Senior House Officer grade at St. Helens Hospital (196 Beds). The post is approved for the 6 months training in casualty work required of candidates for the Fellowship of the Royal College of Surgeons.

Applications, stating age, qualifications and experience, and giving 2 names for reference, should be forwarded immediately to N. RICHARDS, Group Secretary.

Whiston Hospital, Prescot.

SWANSEA HOSPITAL, Swansea. (403 Beds.) Glantawe HOSPITAL MANAGEMENT COMMITTEE. Applications are invited for the post of SENIOR HOUSE OFFICER in the Gynæcological Department at the above Hospital.

Applications, with full particulars, should be addressed to the Hospital Secretary. T. E. JONES, Group Secretary.

SWINDON AND DISTRICT HOSPITAL MANAGEMENT COMMITTEE. SWINDON HOSPITALS. Applications invited for post of RESIDENT HOUSE PHYSICIAN in acute Medical Unit of 64 Beds at St. Margaret's Hospital. Recognised for training under pre-registration internship regulations and vacant on 25th May, 1957.

Full details, with names of 3 referees, to Secretary, 7, Okus-road, Swindon, immediately.

SUNDERLAND. THE ROYAL INFIRMARY. The CASUALTY DEPARTMENT. A vacancy will occur early July, 1957, for a CASUALTY OFFICER (Senior House Officer grade). The Casualty Officer is to take charge of the Casualty Department under the direct supervision of a Senior Surgeon. This post is recognised for the F.R.C.S.

Applications, with names of 2 referees, to the Hospital Secretary, Royal Infirmary, Sunderland.

TAPLOW, BERKSHIRE. CANADIAN RED CROSS MEMORIAL HOSPITAL. Applications invited for post of SENIOR HOUSE OFFICER, to Special Unit for Juvenile Rheumatism, vacant 12th June and tenable for 6 months in first instance. Post offers scope for those interested in research, pædiatrics, rheumatology or cardiology, and previous experience in 1 of these desirable.

Applications, stating age, qualifications, experience with dates, with copies of 3 testimonials, to Secretary.

TAUNTON AND SOMERSET HOSPITAL. Applications are invited for SENIOR HOUSE OFFICER (resident Surgical Officer) post. Vacant 1st June, 1957. This is a post giving excellent experience in surgery, including operating work according to qualifications and experience. The post is recognised by the Royal College of Surgeons as a qualifying appointment for the Final Fellowship examination.

Applications, stating age, nationality and qualifications, together with the names of 2 referees, should be forwarded to the Group Secretary, Taunton Hospital Management Committee, Taunton and Somerset Hospital, Musgrove Park Branch, Taunton, Somerset.

TYNEMOUTH VICTORIA JUBILEE INFIRMARY. (115 Beds.) RESIDENT SENIOR HOUSE SURGEON required.

Applications, with names of 2 referees, to Group Secretary, Preston Hospital, North Shields.

WALSALL HOSPITAL MANAGEMENT COMMITTEE. Locum Tenens HOUSE OFFICER (medicine) required at the General (Sister Dora) Hospital up to end of July; shorter period considered.

Applications to Group Secretary, Walsall General Hospital.

WAKEFIELD. PINDERFIELDS GENERAL HOSPITAL. Applications invited for position of SENIOR HOUSE OFFICER in the Neurological Department. Salary £819 10s. p.a. A charge of £150 p.a. is made for accommodation.

Address written applications, giving full personal particulars and details of experience, &c., together with 2 names and addresses for reference, to W. BOWRING, Group Secretary.

Pinderfields General Hospital, Wakefield.

WAKEFIELD. STANLEY ROYD HOSPITAL. Applications invited for post of JUNIOR HOSPITAL MEDICAL OFFICER in Psychiatry. Salary scale £852 10s.–£55–£1182 10s. p.a. Married accommodation may be available.

Address written applications, giving full personal particulars, details of training, experience, &c., together with 2 names and addresses for reference, to W. BOWRING, Group Secretary.

Pinderfields General Hospital, Wakefield.

WAKEFIELD. CLAYTON HOSPITAL. (200 Beds.) HOSPITAL MANAGEMENT COMMITTEE NO. 9 WAKEFIELD A GROUP. HOUSE SURGEON (general surgery, E.N.T. and ophthalmology) required. Approved pre-registration appointment, recognised for F.R.C.S. Post vacant immediately. Salary and conditions of service in accordance with national recommendations.

Applications to Group Secretary, 113, Northgate, Wakefield.

WARWICK (near). CENTRAL MENTAL HOSPITAL. (1400 Beds.) SENIOR HOUSE OFFICER. Neurosis Unit, adult and child psychiatry clinics, Departments of Electroencephalography, Occupational Therapy, Psychology and social work. Recognised for D.P.M. Flat available.

Applications, with names and addresses of 3 referees, to Medical Superintendent within 14 days.

WATFORD. HOLYWELL HOSPITAL. (82 Beds.) Locum Tenens RESIDENT MEDICAL OFFICER wanted for indefinite period. Junior Hospital Medical Officer scale. Care of 1 infectious disease, 2 tuberculous and 1 non-tuberculous chest ward. Duties are light, giving ample opportunity for reading.

Applications to DR. KARRAN, Shrodells Hospital, Watford (Tel.: Watford 6633).

WELSH REGIONAL HOSPITAL BOARD.

REGISTRAR in Psychiatry, based St. Cadoc's Hospital, Caerleon, Mon. (470 Beds). Full range of modern psychiatric treatments and number of associated hospital outpatient clinics. Resident.

REGISTRAR (orthopædics), Royal Gwent Hospital, Newport. Separate Fracture and Orthopædic Unit (36 Beds). Own Outpatient, X-ray and Rehabilitation Departments. Non-resident.

REGISTRAR (obstetrics and gynæcology), to serve mid-Glamorgan Hospital Management Committee. Based at Bridgend General Hospital. May also be expected to serve other hospitals within Group. Post recognised for M.R.C.O.G. Resident or non-resident.

Subject to review end of first year.

Application forms from Senior Administrative Medical Officer, Temple of Peace, Cathays Park, Cardiff, within 14 days.

WEYMOUTH AND DISTRICT HOSPITAL. (124 Beds.) CASUALTY OFFICER (Senior House Officer grade) required for 4 months—June–September, 1957.

Applications, stating age, qualifications, nationality, and experience together with 2 copy testimonials, to Group Secretary, West Dorset Hospital Management Committee, Damers-road, Dorchester, Dorset, immediately.

WIGAN AND LEIGH HOSPITAL MANAGEMENT COMMITTEE. ROYAL ALBERT EDWARD INFIRMARY, WIGAN. REGISTRAR in General Medicine, resident. Main duties at Royal Albert Edward Infirmary, Wigan.

Applications, giving names of 2 referees, to be sent as soon as possible to the Secretary, Royal Albert Edward Infirmary, Wigan, Lancashire.

WIGAN (near). BILLINGE HOSPITAL. Registrar in Psychiatry (resident or non-resident) to assist Consultant Psychiatrist. Main centre—Billinge Hospital. Active Psychiatric Unit. Modern treatment. Over 300 admissions annually. Post recognised for D.P.M. Good training facilities.

Applications, with names of 2 referees, to Secretary, Wigan and Leigh Hospital Management Committee, Knowsley House, Wigan.

WINCHESTER. ROYAL HAMPSHIRE COUNTY HOS-PITAL. SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD. Applications are invited for the post of REGISTRAR in Obstetrics and Gynæcology with duties at the above Hospital. The post is tenable from 1st August for 1 year. Annual reappointment will be considered without the need for further application. The post is recognised for the M.R.C.O.G. A flat is available.

Forms of application obtainable from the Group Secretary should be completed and returned not later than 25th May.

WINDSOR. KING EDWARD VII HOSPITAL. House SURGEON in General Surgery required, Male or Female, for post vacant 1st July. Recognised for F.R.C.S. Preference given to persons seeking pre-registration post.

Applications, with copies of recent testimonials, stating age, nationality, qualifications with dates, to Secretary.

WOKINGHAM. PINEWOOD HOSPITAL. Medical REGISTRAR required (230 Beds with a Thoracic Surgical Unit). Bronchitis Unit and beds for non-tuberculous conditions of the chest. Unfurnished flat available; residential quarters for single man or woman also available.

Application forms from, and returnable to, Secretary, Windsor Hospital Management Committee Alma-road, Windsor, by 26th May.

WORCESTER ROYAL INFIRMARY. (213 Beds.) Senior HOUSE OFFICER (surgical) required for 1st June at this busy acute hospital which is the Consultative and Accident Centre of the Group. The post, which is recognised for the F.R.C.S. examinations, is deputy to the Surgical Registrar and involves some orthopædic work.

Applications to Hospital Secretary.

WORCESTER ROYAL INFIRMARY. House Surgeon (pre-registration or otherwise) required immediately for Orthopædic Department of this busy general hospital of 213 Beds. The appointment offers wide and varied experience.

Applications to Hospital Secretary.

WORCESTER ROYAL INFIRMARY. House Physician (pre-registration or otherwise) required immediately at this busy general hospital of 213 Beds. The post offers wide and varied experience.

Applications to Hospital Secretary.

CANADA. NORTHWESTERN GENERAL HOSPITAL, TORONTO, 9, ONTARIO. Accredited Hospital, 110 Beds, requires INTERNES. Applications are being considered for Rotating Internship. Pay $150 per month, plus room and board. Ideal preparation for general practice in Toronto area.

British University qualifications accepted in Canada.

NORTHERN IRELAND HOSPITALS AUTHORITY. Applications are invited for the undernoted whole-time posts as Registrar for the year commencing 1st October, 1957.

(*a*) REGISTRAR in Physical Medicine
(*b*) REGISTRAR in Dermatology
} at hospitals managed by the Belfast Hospital Management Committee.

(*c*) REGISTRAR in Radiotherapy at the Northern Ireland Radiotherapy Centre.

The terms and conditions will be in accordance with the application of the Spens report to Northern Ireland.

Applications to be made on a form obtainable with further particulars from the Secretary, Northern Ireland Hospitals Authority, 44–46, Queen-street, Belfast, and to be returned not later than 31st May, 1957.

U.S.A. CAMBRIDGE, MASSACHUSETTS. Applications are invited for the positions of RESIDENCIES in Anesthesia for a 2-year period beginning 1st July and 1st September, 1957. Salary $1800 first year and $3600 second year and full maintenance. Training in all branches of anesthesia. Affiliation with other hospitals.

Applications, stating age, nationality, qualifications, and experience, together with the names of their referees, should be forwarded to the Director of Anesthesiology, P.O. Box 89, Cambridge, Massachusetts. Travelling expenses to and from the U.S.A. will be paid. Particulars will be sent as soon as application is received. Please enclose recent photograph with application.

Public Appointments

BIRMINGHAM. CITY OF BIRMINGHAM EDUCATION COMMITTEE. Applications are invited from registered medical practitioners (Men or Women) for appointment as SCHOOL MEDICAL OFFICER in the School Health Service. The possession of a D.P.H. or D.C.H. will be an advantage. Salary in accordance with Whitley Council scale of £1050–£50–£1200–£55–£1475 p.a. Appointment is subject to the appropriate superannuation act and to the passing of a medical examination.

Forms of application obtainable from the undersigned (stamped addressed envelope) must be returned by 27th May, 1957. Canvassing disqualifies.

E. L. RUSSELL, Chief Education Officer.

School Health Service, 102, Edmund-street, Birmingham, 3.

GLOUCESTERSHIRE COUNTY COUNCIL. Senior MEDICAL OFFICER (maternal and child welfare). Applicants should have a wide experience of maternal and child welfare. Salary £1520–£1955; superannuable; medical examination; car driver and should possess a motor-car.

Application forms obtainable from County Medical Officer of Health, Berkeley House, Berkeley-street, Gloucester, returnable by 1st June, 1957.

GUY H. DAVIS, Clerk of the County Council.

GOVERNMENT OF BAHRAIN. Medical Department. Bahrain Medical Department invites applications from British Male Doctors for the post of ANÆSTHETIST. Age from 30. D.A. qualification essential. Preference given to those who can combine this with other medical duties. Minimum salary £1750, rising £45 annually, no allowances. Private practice among Europeans only. No income-tax. Free quarters with hard furniture and car. Agreement for 2 years, renewable, with 5 months home leave on full pay and free air passage every 2 years for doctor and wife.

Applications, showing candidate's career, age, family responsibilities, 3 testimonials and photograph, should be sent to the Chief Medical Officer, Bahrain Government Hospital, Bahrain, Persian Gulf.

GREENOCK. CORPORATION OF GREENOCK. Applications are invited from registered medical practitioners having previous experience in Public Health work and possessing the Diploma in Public Health or other equivalent qualification for the position of DEPUTE MEDICAL OFFICER OF HEALTH AND DEPUTE PORT MEDICAL OFFICER for the Burgh. The appointment is whole-time, terminable on 3 months notice and is subject to the provisions of the Local Government Superannuation (Scotland) Acts. The salary scale is £1233 6s. 8d., rising by 4 annual increments of £55 and 1 of £50 to £1503 6s. 8d. p.a. with placing according to experience. If desired, housing accommodation will be offered to the successful applicant.

Applications, stating age, present and previous appointments, qualifications and other relevant information, together with the names and addresses of 2 referees, should be lodged with the undersigned not later than Wednesday, 22nd May, 1957. JOHN LIDDELL, Town Clerk.

Municipal Buildings, Greenock, 3rd May, 1957.

WESTERN AUSTRALIA. STATE PUBLIC SERVICE. INSPECTOR-GENERAL (Mental Health Services), Permanent.

Salary range: £A3660 (gross) p.a.

Qualifications: Applicants to possess medical degree registrable in Western Australia and a higher medical qualification. Should have sound clinical experience, administrative ability and knowledge of hospital construction and of latest developments in clinical, preventive, and legal psychiatry.

Duties: Successful applicant will administer the State Mental Health Services, and the related Acts, subject to control by and with direct access to the Minister for Health.

Accommodation: Free furnished residence, fuel, and laundry.

Transport: Reasonable amount allowed for transport of appointee and dependent family to Western Australia, provided Bond is entered into to serve State for period of at least 3 years.

Conditions of service: Superannuation benefits, long service leave, cumulative sick leave and other general conditions applicable to permanent public servants.

Further particulars obtainable from the Official Secretary, Western Australian Government Office, Savoy House, 115, Strand, London, W.C.2, to whom applications, in duplicate, stating age, marital state, qualifications, experience and 2 recent references and names of referees, should be addressed by 30th June, 1957.

LANCASHIRE COUNTY COUNCIL. Applications are invited from registered medical practitioners for appointment as ASSISTANT DIVISIONAL MEDICAL OFFICERS. Vacancies in areas in the vicinity of Lancaster, Wigan, Bolton, Rochdale and Salford. Possession of Diploma in Public Health desirable. Salary £1050, rising to £1475 p.a. Travelling and subsistence allowances where applicable.

Application forms and further particulars from County Medical Officer, Serial 166, East Cliff County Offices, Preston. Application forms to be returned by 25th May, 1957.

NATIONAL COAL BOARD. East Midlands Division. Applications are invited from registered medical practitioners for the post of ASSISTANT AREA MEDICAL OFFICER, No. 1 (Bolsover) Area. The successful applicant will assist the Area Medical Officer in the supervision of an Industrial Health Service in the Area including the examination of new entrants. The work entails underground visits at Collieries. Candidates should have completed hospital and other postgraduate training. Experience in general practice and an interest in the field of preventive or industrial medicine would be an advantage. The commencing salary will be in accordance with qualifications and experience and will be within the range of £1100–£1600 a year. A candidate appointed with a fair amount of postgraduate experience will receive a starting salary of not less than £1200.

Applications, stating age, qualifications, and details of present position and past experience, together with the names of 2 referees, should be sent to the Staff Director, National Coal Board, East Midlands Division, Sherwood Lodge, Arnold, Notts, within 14 days of publication. Please mark applications and envelopes S.V.754.

NOTTINGHAM. CITY OF NOTTINGHAM EDUCATION COMMITTEE. Applications are invited for the post of Whole-time SCHOOL MEDICAL OFFICER on the salary scale £1050 rising to £1475 p.a. The appointment will be subject to the provisions of the Local Government Superannuation acts.

Further particulars and forms of application may be obtained from the Principal School Medical Officer, 28, Chaucer-street, Nottingham. W. G. JACKSON, Director of Education.

STAFFORDSHIRE COUNTY COUNCIL. Appointment of ASSISTANT COUNTY MEDICAL OFFICER AND SCHOOL MEDICAL OFFICER. Applications are invited from fully qualified medical practitioners and those holding the Diploma of Public Health will be given preference. The candidate appointed will undertake clinical work in the School Health and Child Welfare Services under the direction of the County Medical Officer of Health, and will be required to perform such other duties as may from time to time be prescribed. The salary scale is £1050–£50–£1200–£55–£1475, and increments may be given for previous similar service. The appointment will be terminable by 3 months notice in writing on either side and subject to the provisions of the appropriate Superannuation Acts and Regulations, in which connection the selected candidate must pass a medical examination and submit his or her birth certificate.

Forms of application may be obtained from the County Medical Officer, County Buildings, Stafford, to whom they should be returned when completed not later than by 31st May, 1957.

T. H. EVANS, Clerk of the County Council.

County Buildings, Stafford, 2nd May, 1957.

STOKE-ON-TRENT. CITY OF STOKE-ON-TRENT. Appointment of ASSISTANT MEDICAL OFFICER OF HEALTH. Applications are invited from qualified medical practitioners (Women) for the post of Assistant Medical Officer on the Maternity and Child Welfare Services. Candidates should have experience in diseases of children and obstetrics. Opportunity will be given for hospital contact with pædiatrics and obstetrics. The possession of a D.P.H. or D.C.H. will be considered an additional qualification. The salary will be in accordance with the Whitley Council scale, commencing according to experience. The appointment will be subject to the provision of the National Health Services (Superannuation) Regulations, 1947, and the successful candidate will be required to pass a medical examination.

Forms of application may be obtained from the Medical Officer of Health, Public Health Department, Glebe-street, Stoke-on-Trent, and should be returned, accompanied by copies of not more than 3 recent testimonials, as soon as possible.

HARRY TAYLOR, Town Clerk.

YORKSHIRE. COUNTY COUNCIL OF THE WEST RIDING OF YORKSHIRE. Joint appointment of SENIOR ASSISTANT COUNTY MEDICAL OFFICER AND SCHOOL MEDICAL OFFICER to the Brighouse Corporation, the Elland Urban District Council and the West Riding County Council. Applications are invited from registered medical practitioners, Men or Women, for the above post. The Senior Assistant County Medical Officer and School Medical Officer will be on the staff of the County Medical Officer's Department but will work under the administrative direction of the Divisional Medical Officer and the Medical Officer of Health, who is responsible for the day to day administration of practically all public health matters in the Division. The duties of the office will be mainly clinical in the School Health and Infant Welfare Services, but in addition to these duties the person appointed will be required to act for the Divisional Medical Officer and Medical Officer of Health in his absence, and will be appointed as Deputy Medical Officer of Health to the constituent Authorities. Candidates must be in possession of the D.P.H. or be nearing completion of training for the D.P.H. The scale of salary is at present £1150–£1575 p.a. Travelling and subsistence allowances according to the County Council's scale are payable in addition to salary. The post is superannuable and the successful applicant will be required to pass a medical examination as to physical fitness.

Forms of application can be obtained from the undersigned to whom they should be returned not later than 25th May, 1957.

J. WOOD-WILSON, County Medical Officer.

County Hall, Wakefield.

FACTORY DOCTORS. Factories Acts, 1937 and 1948. The following appointment as Appointed Factory Doctor is vacant. Apply to Chief Inspector of Factories, 19, St. James's-square, London, S.W.1.

District	*County*	*Latest date for receipt of applications*
TALYBONT ..	.. CARDIGAN ..	.. 25TH MAY, 1957

SOUTH CORK BOARD OF PUBLIC ASSISTANCE. Vacancy for TEMPORARY OBSTETRICAL AND GYNÆCOLOGICAL RESIDENT MEDICAL OFFICER, St. Finbarr's Hospitals, Cork. Remuneration £702 15s. p.a.

Application forms and particulars may be obtained on request from the County Manager, Courthouse, Cork, with whom completed applications should be lodged not later than 5 P.M. on Thursday, 16th May, 1957.

General Practice

For an **Executive Council post** *(England and Wales) apply on form* E.C.16A *obtainable from the council. Mark envelope "Vacancy."*

DEWSBURY, YORKSHIRE. Applications are invited for VACANCY (urban). Doctor resigning. List at 1st April, 1957, 2819 (all prescribing patients), Intermediate area. Residence with surgery attached for sale, situated near town centre. Apply on Form E.C.16A (available on application) not later than 25th May, 1957, to—

R. VOLLANS, Clerk of the Dewsbury Executive Council.
Church House, Church-street, Dewsbury, Yorkshire
(Tel. No. 2191).

RYE ROAD, HODDESDON. Applications are invited for a Medical Practice. Doctor resigning. List at 1st April, 1957—1412. Modern detached house with surgery and garage available for purchase. Apply on Form E.C.16A to the undersigned not later than 20th May, 1957. A. E. SHORT, Clerk of the Council.
156/8, Fore-street, Hertford.

SOUTH DEVON. Applications are invited for Vacancy (death) in South Devon coastal town. List approximately 1400. Premises available for purchase. Applications on Form E.C.16A should reach the undersigned not later than first post 20th May, 1957. Further details may be obtained on request.

H. BELL, Clerk, Devon and Exeter Executive Council.
46, Queen-street, Exeter.

CANADA. Ophthalmic practice, very large, for sale to 2 Ophthalmic Surgeons. 6–12 months introduction. Purchase office equipment only requirement. All income-tax deductible. Up to one-half (£5000) accepted in blocked Sterling. Balance low interest 5-year loan arranged. Full cost equals 6 months net.—Reply to: Address, No. 294, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Miscellaneous

The World Health Organization, Geneva, offers 2 posts for editors. Requirements: English mother-tongue; good reading knowledge of French; University degree or equivalent in experience; ability to write well, experience of sub-editing, preferably with medical or scientific journal; some knowledge of medical or biological sciences a distinct advantage. Initial 2-year contract with 1-year probationary period. Initial salary range: $3600–$4800 a year (pensionable), plus allowances. Short-listed candidates may be required to take a written examination in London or Geneva.

Detailed curriculum vitæ should be sent to the Personnel Office, World Health Organization, Geneva, before 20th May. Applicants who have not received personal acknowledgment from W.H.O. by 31st May should consider that their offer has not been retained.

Assistant Medical Officer, resident, required for old established private mental hospital in the South East. Previous psychiatric experience not essential. House available. Total emoluments worth £1100 p.a.—Address, No. 292, THE LANCET Office, 7, Adam-street, Adelphi, London, W.C.2.

Locum Tenens or permanency (part-time). A vacancy will shortly arise for a third Medical Officer in this private psychiatric nursing-home, whose normal capacity is 90 patients of both sexes. Applicants should have a knowledge of general medicine, and psychiatric experience is not essential. All modern psychiatric treatments are carried out here. Living-in accommodation, with full board and lodgings, is provided gratis. Normal scale fees for the position are paid. The retiring holder of the position at present works 4 full days, that is, 8 sessions a week. The services of his successor will be desirable in approximately 1 months time.

Those who propose to apply should, in the first place, get into contact with the Medical Superintendent, THE PRIORY, Upper Richmond-road, West, S.W.15, telephone nos. PROspect 1743/8658, or by letter. There is no age limit and Medical Practitioners of either sex are entitled to apply. From the point of view of those who are "climbing the ladder" a very wide experience of psychiatric illness, neurosurgery and other treatments of mental illness are available here.

H. J. Heinz Company Limited, Food Manufacturers. Applications are invited from registered medical practitioners for the post of Medical Officer to the above Company at their factories in Wigan. Candidates should be aged about 32, should have a good clinical background, preferably with some experience of industrial medicine. The possession of a D.I.H. would be an advantage. The successful candidate would be expected to work under the general direction of the Principal Medical Officer. Commencing salary £1600 p.a.

Applications, giving full details of qualifications and experience, together with the names of 3 referees, should be sent to the Principal Medical Officer, H. J. Heinz Co., Ltd., Harlesden, N.W.10.

British Overseas Airways Corporation. Applications are invited for the post of Research Medical Officer in the Corporation's Medical Service. Applicants should be between 30 and 35 years of age, well qualified academically and should possess a high standard of practical and theoretical knowledge of aviation medicine and physiology. Experience as a qualified pilot and the medical care of aircrew will be an advantage. The successful applicant will be based at London Airport and the work will include all aspects of aero medical engineering research as applicable to the Corporation's aircraft and flying staff, and will involve flying at home and overseas. The Research Medical Officer will work in close liaison with the Corporation's Flight Operations and Engineering Departments. Commencing salary will be in the range £2125–£2500 p.a. according to age, qualifications and experience. The successful candidate will be required to join the Corporation's Pension Scheme.

Applications should be made, together with details of professional qualifications and experience to the Chief Personnel Officer, B.O.A.C. Headquarters, London Airport, Hounslow, Middx. The closing date for receipt of applications will be 14th June, 1957.

Messrs. John Wyeth & Brother Ltd., Clifton House, Euston-road, London, N.W.1, invite applications for the full-time post of Assistant Medical Director. Applicants, preferably between 30–40 years of age, should be registered medical practitioners, with good clinical experience. Salary not less than £1750.

Applications should be addressed to the Medical Director.

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